THE IRON TRADE REVIEW

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RAILROAD BUYING

PROMISES TO BE AN IMPORTANT FACTOR.

Heavy Demand for Agricultural Machinery—Continued Activity in Steel Bars—Pig Iron Quiet With Some Tendency Toward Weakness.

Continued activity in iron and steel bars, a part of the demand coming from railroad interests, has been an encouraging feature of the week, and indications are not lacking that considerable buying for repairs of equipment and for maintenance of way by the railroads will not long be delayed. Several western trunk lines have given orders for the immediate repair of track and rolling stock, and already specifications for a large tonnage of iron and steel and other equipment have been received. There is an immense demand for agricultural machinery, and some manufacturers of agricultural implements are working night and day. There has also been some improvement in the demand for merchant pipe, but in shapes, plates, sheets and other finished lines the volume of business is very small.

Iron Ore Conditions

Sales of iron ore at the reduced prices are being made at a moderate rate.

Many more vessels are in commission on the lakes, but independent interests are having difficulty in obtaining cargoes. The labor situation on the lakes is still unsettled. The labor leaders are not disposed to invite a conflict at the present time, but it seems hardly probable that the open shop program will be acceded to without a protest, and it is generally expected that there will be a strike some time during the season. There is considerable uncertainty as to freight rates on ore, last year's rate already having been shaded five cents.

Pig Iron Very Quiet

The pig iron market has been very quiet throughout the country, and no notable sales have been made. In the central west prices have been firm, but in the east and to some extent in the south, there is a tendency toward weakness. Although nearly all southern sellers are unwilling to dispose of their iron for less than $12 Birmingham for No. 2, two or three companies are understood to have sold at from $11.50 to $11.70.

Iron and Steel Bars

Persistent rumors of low quotations on steel bars have attracted much attention, and are attributed to the fact that bars rolled from old rails in the Chicago territory have been sold as low as $1.20 per hundred pounds at the makers' mills. There is no evidence of shading of the recently established price of soft steel bars, which are rolled from new material, and the price of old rails has advanced so that the re-rolled product cannot be sold so low as it has been recently. Buying of bars by implement manufacturers has been followed by heavy contracting by other interests, and in spite of the recent announcement that the new price was for delivery up to Oct. 1 only, yearly contracts are now being freely made. Bar iron has been sold by eastern mills as low as $1.20 at the mill, and has been delivered in territory where eastern mills cannot ordinarily dispose of their product.

Coke and Old Material

There is considerable activity in the coke market in the Pittsburg district. Some interests are unwilling to sell at present prices for delivery next year. Recent activity in the old material market at Chicago and elsewhere has suddenly ended.

STEEL RAILS

DISCUSSED BY AMERICAN SOCIETY FOR TESTING MATERIALS.

Able Address by President Dudley—Closer Co-operation of the Society and the Government in Important Work.

(Special Telegram).

Atlantic City, N. J., June 23.—The 11th annual meeting of the American Society for Testing Materials promises to be the most important gathering in the history of this rapidly growing organization. The steel rail question, ably discussed by Dr. C. B. Dudley in his presidential address this evening, will be further considered Wednesday afternoon, and the intentions of the railroad engineers will be met by the manufacturers, whose representatives are already in evidence in large numbers.

The opening session, held at the Hotel Traymore this afternoon, was attended by upwards of 150 members. The report of the executive committee showed a net growth in membership of the year of 90, making the total enrollment 1,015. In view of the depressed business condition of the year, this record is most gratifying and is an indicator of the firm position to which the society has attained. The report also referred to a recent meeting of the committee which was attended by the representatives of various government branches, prominently interested in the testing of materials, to consider the desirablility of establishing closer relations with the society and the means by which this might be accomplished. Attention was directed to the desirability of presenting at the annual meetings brief summaries of the government activities in matters relating to the testing of materials and the presentation of papers by representatives of the various government laboratories relating to the results of especially interesting investigations of the properties of materials conducted during the year. Co-operation between

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THE WEEK IN IRON CENTERS

PITTSBURG.

Activity in Steel Bars, But Other Lines Are Very Quiet.

Office of THE IRON TRADE REVIEW,
510 Park Bldg., June 23.

Although the recent price reductions in iron and steel products have released considerable tonnage which had been suspended in anticipation of such a development, it is clear that the results so far apparent have not fulfilled the expectations of the most sanguine.

In steel bars, the lower price has met with an encouraging response, principally from the implement manufacturers, who usually buy at this season of the year and other lines of consumption are beginning to more actively contract for their bar material. But outside of steel bars there are no manifest effects of the reductions.

If the immediate purpose that dictated the price changes was to stimulate a full confidence among buyers as to the future, it would appear from present evidences that the effort has not yet been productive of the desired results. The trade generally is still obligating itself to take only that tonnage for which it has actual need so far as orders for its products go, and quick shipment instructions continue very familiar expressions to the mills.

Some consumers are still in a state of uncertainty as to the stability of present prices and await further assurance that there will be no more concessions. As to plates and structural shapes, the sentiment was expressed at an informal gathering of manufacturers in New York last week that there should be no more reductions.

Sentiment among iron and steel manufacturers as to the near future of the industry is more clearly defined and the belief is being freely expressed by some that the turn toward a recovery of prosperity has actually taken place.

Some quite favorable reports on mill operations at the present time are being made. The Republic Iron & Steel Co. has more mills in operation than at any time in the past seven months. The Homestead works of the Carnegie Steel Co. also has as full a schedule this week as any during the present year, the activity being due principally to structural steel, for which a considerable accumulation of specifications has been lately received.

Pig Iron.—A week of but a few transactions and light inquiry in pig iron has been passed, and the situation is now one of general quietness. Prices are holding firm at the present level for prompt and third quarter shipment. The matter of deliveries is being carefully weighed by the furnaces, and they are asking advanced prices for any extended shipment. The largest transaction of the week has been 1,000 tons of basic to this district for delivery over the last half, at a price close to $15.25 valley. In foundry any time in the past seven months. The sales are in small amounts. We note the sale of 300 tons of No. 2 iron for western Pennsylvania delivery, through August, at a price equivalent to $15 valley, although the seller was not a valley interest. A lot of 100 tons, low in silicon, for the same delivery, brought $14.75 valley. There is an inquiry in the market for 10,000 tons of foundry and malleable for delivery over the next nine months, to New York state. A number of small deals are being made in malleable, and the market ranges from $15 to $15.50. A lot of 400 tons for June, July and August to New York state brought about $15.50 valley basis. Another sale of 200 tons for delivery up to September to go east, was made on a basis of about $15.25 valley. The Bessemer market is very dull, sales being confined to carloads. Some interest in gray forge is noted, and there is one inquiry out for 1,000 tons for local delivery. Operations in the valley have been increased by the addition of the Fannie stack of the United Iron & Steel Co. at West Middlesex, which went in this week on Bessemer.

The southern situation is unchanged, the market for No. 2 ranging from $12 to $12.50 according to the ideas of the seller. A sale of 300 tons for prompt delivery to Pittsburg is reported this week at $12 Birmingham. The Republic Iron & Steel Co. will start its No. 3 Birmingham stack about July 1. Its entire furnace capacity will then be in operation. For prompt and third quarter delivery, we quote as follows, high quotations on Bessemer being for chilled cast:

Bessemer, valley	$16.00 to 17.00
Bessemer, Pittsburg	16.90 to 17.90
No. 1 foundry, Pittsburg	16.15 to 16.40
No. 2 foundry, Pittsburg	15.90 to 16.15
Gray forge, Pittsburg	14.90 to 15.15
Basic, valley	15.25 to 15.50
Basic, Pittsburg	16.15 to 16.40

Ferro-Manganese.—The inquiry for ferro-manganese is not so brisk as it has been, but there is a fair amount of business going. We quote 80 per cent ferro-manganese, for prompt and future shipment, at $44 to $45 Baltimore or $45.95 to $46.95 Pittsburg.

Imported 50 per cent ferro-silicon is quoted $70 Pittsburg on forward deliveries; domestic 12 per cent, $29; 11 per cent, $28; 10 per cent, $27. The lower grades of imported ferro-silicon are upon about the same basis. These quotations are applicable to Pittsburg territory.

Plates.—The demand for plates is not increasing and the market continues dull. Enough specifications have accumulated to warrant the mills turning out a fair tonnage this month, but future prospects are not promising. At an informal meeting of a number of the leading producers in New York last week, the unanimous sentiment was expressed that no further reductions in plates should be made. We quote:

Tank plate, ¼-inch thick, 6¼ to 100 inches, 1.60c f. o. b. mill Pittsburg. Extras are as follows per 100 pounds: Boiler and flange steel plates, 0.10c; A. B. M. A. and ordinary firebox steel plates, 0.20c; still bottom steel, 0.30c; marine steel, 0.40c; locomotive firebox steel, 0.50c; all sketches, excepting straight taper plates varying not more than 4 inches in width at ends, narrowest end not being less than 30 inches, 0.10c; circles, 0.20c. Plates in width over 100 inches up to 110 inches, 0.05c; over 110 inches up to 115 inches, 0.10c; over 115 inches up to 120 inches, 0.15c; over 120 inches up to 125 inches, 0.25c; over 125 inches up to 130 inches, 0.50c; over 130 inches, 1c. Gages under ½-inch to and including 3/16-inch plate on thin edges, 0.10c; under 3/16 to and including No. 8, 0.15c; under No. 8 and including No. 9, 0.25c. Five cents extra for less than carloads. Terms, net cash in 30 days.

Sheets.—There is no change in the sheet situation and the tonnage coming to the mill is largely in small orders for quick shipment. Makers express the belief that there will be no change in sheet prices. We quote black steel sheets, cold rolled, No. 28 gage, at 2.50c per 100 pounds, and galvanized sheets, No. 28 gage, 3.55c per 100 pounds, plus the regular extras.

Blue annealed: Nos. 11-12, 1.85c; Nos. 13-14, 1.90c; Nos. 15-16, 2c. Corrugated roofing, $1.75 per square for No. 28 painted, 2½-inch corrugation;

and $3.10 per square on galvanized roofing, 2½-inch corrugation, No. 28.

Tin Plate.—The usual favorable report is made in tin plate. The mills of the leading interest and independents are operating at practically full capacity, with good prospects for the summer. We quote:

Coke tin plate, 100-pound basis, 14 x 20, $3.70 f. o. b. mill Pittsburg district. Terms, 30 days, less 2 per cent for cash in 10 days.

Rails and Track Material.—Specifications from railroads against contracts for standard sections show some increase, the rails going to repair and incidental construction purposes. There is some inquiry for standards by lumber companies. The light rail market is active, and sales of the local interest in the week are reported to be 2,000 tons. Re-rollers are quoting low prices on lights. The activity of the rail mills in this district has not changed. On present specifications on Bessemer rails we quote as follows:

Fifty-pound and heavier, 500-ton lots and over, $28; carloads and less than 500 tons, $30; less than carload lots, $32; 8-pound, $36; 12-pound, $32; 16-pound, $30; 20-pound, $29; 25 to 45-pound, $28; angle splice bars for standard sections, $1.65; standard spikes, $1.70 to $1.80 Pittsburg; hand spikes, $1.80 to $1.90 Pittsburg.

Steel.—The reduction in the official price of billets has not increased business, and the market continues fully as dull as it has been. Sheet and tin bars are moving favorably, and the price changes have not increased their activity. We quote:

Bessemer and open-hearth billets, base sizes, $25 Pittsburg, and forging billets at $27 Pittsburg, subject to the division of the freight charge over $1 and not exceeding $3, and sheet and tin bars at $27.50 Pittsburg, valley and Wheeling territory, and $27 Pittsburg for delivery to other points.

Hoops, Bands and Cotton Ties.—There is some improvement in the tonnage being taken in hoops, but this market has been in fairly good shape throughout the depression. Cotton ties are now moving from the warehouses to the trade. We quote the following official prices:

Cotton ties, 85c per bundle Pittsburg, plus the freight on lots of 3,000 bundles or more, and 88c per bundle Pittsburg for less than 3,000 bundle lots.

Hoops in carload lots, 1.80c; in less than carload lots, 1.90c; bands, 1.40c. base half extras as per standard steel.

Merchant Bars.—A thorough investigation of the reports published in some of the daily press that steel has been sold in the Chicago and western territory to the agricultural implement makers at as low a basis as 1.20c, base f. o. b. Pittsburg, plus freight to deliver, warrants us in the statement that there is no foundation for this report. It probably arises from the sales made of bars rolled from old rails by the four western mills located immediately in the Chicago territory producing that character of material, which was sold some months ago at phenomenally low prices certainly as low as 1.20c at the mill in at least one notable case. The advance in the price of re-rolling rails has made a continuance of this price impossible, and the present minimum for bars from old rails seems to be 1.35c at makers' mills, although tonnage was placed up to the last week or 10 days at approximately 1.30c. The amount of material that can be used of this character is limited so far as the implement trade is concerned and will only be accepted for concrete reinforcing bars in a certain class of work. The 1.20c price refered to was a special transaction involving other material for concrete work. There has been no shading by any interests, so far as our investigation goes, of the recently established price of soft steel bars, and tonnage booked, we have reason to believe, is more than the recent estimates, although, as heretofore explained, a large part of this tonnage is old contracts rewritten at the reduced price. The present price of 1.35c maker's mills, for bars from old rails makes this material unavailable to manufacturers located at remote points from the mill, as the freight rate added to the mill price makes the price of these inferior bars either higher than the price of billet stock or so close to it that the greater economy in the use of billet stock makes that material so much more desirable to the general buyer.

The buying of bars by the implement manufacturers has practically ended, but there is considerable contracting by buyers of the general trade. This class of buyers is coming into the market more confidently, and is giving the situation a better tone. The time limit of Oct. 1 for tonnages to be taken out at the 1.40c basis, which was originally set at the time of the reduction, is no longer being observed by the mills and contracts are being taken for the full year. Bar iron trade is dull. We quote as follows:

Common iron bars, 1.40c Pittsburg in carload lots and over; 1.45c in less than carloads; 1.32c to 1.35c base Pittsburg plus freight to point of shipment on western deliveries; Bessemer steel bars, 1.40c; plow and cultivator, 1.40c; channels, angles, zees, tees, under 3 inches, 1.50c, all f. o. b. Pittsburg. The following differentials are maintained on steel: Less than 2,000 pounds, 0.10c advance; less than 1,000 pounds of a size, 0.30c advance. Cold rolled and ground shafting 56 per cent in carloads, and 52 per cent in less than carloads, delivered in base territory; open-hearth spring steel, 2.25c to 2.50c; sleigh shoe flats, 1.60c to 1.65c; smooth finished machinery steel, 1.90c to 2c; toe calk, 2.10c to 2.15c. Planished and machine straightened tire steel is 1.80c base. Iron finished tire under 1½ by 1½ inches, 1.75c; iron finished tire, 1½ by 1¼ inches and over, 1.60c. All tire subject to ½ extra on the steel card.

On cold rolled strip steel, width 1½ inches and wider and 0.100 inch and thicker, we quote base prices per 100 pounds, $3.60 on hard and $3.75 on soft.

Structural Material.—The success of certain large fabricators in this district in obtaining a good portion of recent contracts awarded, has diverted considerable structural steel business to local mills. The Homestead mills this week have as full a rolling schedule as at any time in the present year, all the structural mills being in operation and almost the entire open-hearth capacity. The plate mills are not so active. Sufficient specifications have been accumulated to insure approximately this activity up to July 4. This condition cannot be attributed directly to the recent price reduction, but rather that numerous projects are demanding steel at this particular time. The structural situation generally is not encouraging, particularly as to the railroads, by which it is reasonable to expect that little new work will be started owing to the lateness of the season, even should efforts at financing prove successful. Fabricating material is going at low prices. A number of the representatives of leading mills met informally in New York last week and expressed the conviction that there would be no further change in structural material prices. We quote:

Beams and channels, 15-inch and under, 1.60c; over 15 inches, 1.70c; zees, 1.60c; tees, 1.65c; angles from 3 to 6 inches, 1.70c; universal and sheared plates, 6¼ inches and wider, 1.60c base.

Merchant Pipe.—Some increase in the movement of merchant pipe has appeared, attributable to the recent price reduction. From the jobbers' standpoint, however, there is not much change and their specifications continue as they have been. Lap weld pipe is showing gains. In line pipe reports are current that the Tidewater Oil Co. is getting ready to carry out

its project, to construct a pipe line from New York state to the Illinois oil field, which will require over 500 miles of 6-inch pipe. This undertaking has been before the trade for some time. At a meeting in this city last week, of enameled pipe makers, it was decided to make no change in prices. We quote the following official base discount to consumers in carloads, with an additional one point and five off to jobbers:

	—Steel—		—Iron—	
	Black.	Galv.	Black.	Galv.
¾ to 6 inches....	75	65	73	63

Boiler Tubes.—The volume of business in boiler tubes is very moderate and projects are for immediate needs. We continue to quote the following discounts:

	Iron.	Steel.
1 to 1½ inch.....	42	47
1¾ to 2¼ inch.....	42	59
2½ inch	47	61
2¾ to 5 inch.....	52	65
6 to 13 inch.....	42	59

2½ inches and smaller, over 18 feet, 10 per cent net extra.
2¾ inches and larger, over 22 feet, 10 per cent net extra.

Wire Products.—The disposition to regard the present market with hesitancy is apparent. The recent changes have not increased business. If anything, they have caused consumers to hold back their tonnage temporarily, and the market lacks substance. We quote as follows:

Wire nails, jobbers' carload lots, $1.95; retailers' carload lots, $2; painted barb wire, jobbers' carload lots, $2.10; retailers' carload lots, $2.15 with 30c for galvanizing; plain wire to jobbers in carloads, 1.80c; and to retailers in carloads, 1.85c.

Wire Rods.—Users of rods are specifying guardedly. There is little new business. We quote $33 Pittsburg on Bessemer and $34 Pittsburg on open-hearth rods.

Coke.—A fairly consistent demand is under way in coke and the market displays considerable activity. Some operators are unwilling to sell at present prices beyond the end of the year, although exceptions are frequently made in the case of old customers. A local melter is in the market for from 125 to 150 cars of foundry and from 30 to 50 cars of foundry coke were put through this week for extended deliveries at $2.25 ovens. In furnace coke, there is a moderate buying and one furnace in this district has been asking for prices on its yearly requirements, but has not yet closed. We quote standard Connellsville foundry coke at from $2.15 to $2.25 ovens and for standard Connellsville furnace coke from $1.65 to $1.85 ovens, the lower quotation being for prompt shipment and the higher for extended deliveries. Operations in the Connellsville region are increasing and are estimated at a little more than 30 per cent. The Rainey interests, the Washington Coal & Coke Co., and others put in a number of additional ovens this week. The *Courier* for the week of June 6 to 13 shows 15,305 active and 22,053 inactive ovens with an output of 162,947 tons, compared with 14,828 active, 22,577 inactive ovens and 155,846 tons the preceding week.

Old Material.—The dullness in old material is giving the market a stagnant appearance and there are few symptoms of improvement to be noted. Outside of several interests, there is little buying, the mills are holding closely what little scrap they are producing and dealers are waiting for the turn to come. A slight stiffening is noted in the prices of rerolling rails, bundled sheet scrap and old axles. We quote nominally, gross tons, delivered in the Pittsburg district as follows:

Heavy melting scrap, $12.75 to $13.25; rerolling rails, $14.50 to $15; bundled sheet scrap, $9.50 to $10; iron axles, $19 to $20; old iron rails, $15 to $16; No. 1 wrought scrap, $13.25 to $13.75; old car wheels, $13 to $13.50; low phosphorus, $17.50 to $18; machine shop turnings, $8 to $8.50; cast borings, $7.50 to $8; No. 1 cast scrap, $13.75 to $14.25.

CLEVELAND.

Moderate Sales of Ore—Bar Iron Shipped from Eastern Mills.

Office of THE IRON TRADE REVIEW,
Browning Building, June 23.

Iron Ore.—Ore shipments have increased during the past week, and there is, consequently, considerably more activity on the lakes. The Steel Corporation now has nearly all its own vessels in commission and has made contracts with independent vessels for a few cargoes. In such cases freight rate was not fixed, the agreement being that the going rate was to be paid. There is considerable uncertainty as to what rate will prevail. A few contracts have been made at 70 cents from the head of the lake, which is 5 cents below last year's rate. Large shippers could, probably, obtain further concessions if they were so disposed, but it seems likely that the 70-cent rate will prevail for a time at least. Union labor is sullen in its attitude toward the policy of adopting the open shop on the lakes, but labor leaders recognize that the present is not a favorable time for them to make a fight, and there is no immediate prospect of a strike on the lakes. Every effort is being made by the vessel interests to obtain crews whose members will not go out on strike later, but it will be surprising if the open shop prevails throughout the season without a conflict with labor.

Selling of ore has progressed at a moderate rate during the past week. Some furnace interests, especially those well supplied with ore, express regret that the ore price was reduced, as they fear the result on the pig iron market. A modification of the method of figuring prices of ore is now under consideration. During the past two years, the average analysis of the ore shipped has been so generally under the contract guarantee that furnace interests claim that an injustice is done them. For ores running low in iron content, the cost of fluxing the extra gangue and silica is heavier, they say, than is represented by the concession in price due to the decreased iron content. Furnace men contend, therefore, that for iron below a certain percentage, additional penalties should be attached. A committee of the ore interests is now working out a new plan of figuring prices.

On base ores, with the guarantee of 55 per cent on old range and Mesabi Bessemer, and 51½ per cent on old range and Mesabi non-Bessemer, we quote as follows: Old range Bessemer, $4.50; Mesabi Bessemer, $4.25; old range non-Bessemer, $3.70, and Mesabi non-Bessemer, $3.50.

Pig Iron.—The market continues quiet, but few sales being made, and those generally for small tonnages. Prices are firm. One stack of the Toledo Furnace Co. will soon be blown in. For Cleveland delivery we quote as follows:

Bessemer	$16.90 to 17.10
No. 1 foundry	16.00 to 16.50
No. 2 foundry	15.75 to 16.00
No. 3 foundry	15.50 to 15.75
No. 2 southern	16.35
Gray forge	14.50 to 15.00
Lake Superior charcoal	19.50 to 20.00

Coke.—The market has been featureless during the past week. We quote $1.75 to $1.80 at the ovens for furnace coke, and $2.25 for high grade foundry coke.

Finished Material.—The feature of the week has been the activity in bars. A number of contracts for steel bars to interests other than agricultural implement manufacturers have been made, or are about to be closed. An encouraging feature of the bar iron market has been the placing of some orders for moderate tonnages by several railroads, indicating a possible buying movement by those interests. A disturbing factor of the bar iron market has been the attitude of some eastern manufacturers who have managed to take a few orders in this territory by selling at 1.40c Cleveland, equivalent to about 1.20c at makers' mills. At least one eastern manufac-

turer is openly quoting 1.30c at its mills.

Old Material.—A firmer tone than anticipated is felt in the market, in spite of the closing of heavy lists of railroad material several days ago. A slight advance is noted in turnings and drillings, amounting to about 25 cents a ton, and in country mixed steel an advance of $1 a ton. We quote, f. o. b. Cleveland, as follows:

Old iron rails	$15.00 to 15.50
Old steel rails (re-rolling)	13.00 to 13.50
Old steel rails (under 6 ft.)	13.00 to 13.50
Old car wheels	12.75 to 13.25
Old steel boiler plate	11.50 to 12.00
Steel axles	17.00 to 18.00
Malleable iron (railroad)	12.00 to 12.50
Malleable iron (agricultural)	10.00 to 10.50
Heavy steel	12.50 to 13.00
Country mixed steel	11.00 to 11.50
Low phosphorus	15.50 to 16.50

We quote, net tons, as follows:

No. 1 R. R. wrought	12.50 to 13.00
No. 1 busheling	11.00 to 12.00
No. 1 machine cast	11.50 to 12.50
Iron axles	17.00 to 18.00
Axle turnings	9.00 to 9.50
Machine shop turnings	6.50 to 7.00
Grate bars	9.00 to 10.00
Pipes and flues	10.00 to 10.50
Tank iron	10.00 to 10.25
Hoop and band iron	6.50 to 7.50
Sheet iron	4.25 to 5.25
Wrought drillings	6.50 to 7.00
Stove plate	10.50 to 11.00
Cast borings	5.50 to 6.00

CINCINNATI.

Pig Iron Market Very Dull—Prices Are Unchanged.

Office of THE IRON TRADE REVIEW,
First National Bank Bldg., June 23.

Pig Iron.—Inquiry and demand have been practically nil during the week. A few buyers have made offers to take tonnages running from 100 tons to 500 tons at prices under the market, but so far as can be learned furnace interests have declined to consider these propositions. In a few instances, sellers report that quotations of $12 Birmingham on southern iron do not get orders and intimate that perhaps this price has been shaded, but there is nothing substantial to lead to the belief that anything below $12 is being done. Consumers are not taking their iron on their contracts up to the quota provided for at the time of sale, but hold up shipment requests are not sufficiently frequent to be a feature. The attitude of southern producers appears to be uniformly in favor of maintaining $12 Birmingham; and reports from the south indicate that furnace men have full confidence in the future. Northern furnaces in southern Ohio are maintaining their prices and quotations range from $14 to $16 at furnace for No. 2 foundry. The call for basic iron has subsided and for silvery iron $18.50 for 8 per cent is still the quotation in Jackson county. The market is featureless and quiet and apparently without tendency in either direction. Low grades continue scarce, but under lack of demand nothing has developed to test prices. We quote for prompt delivery and third quarter, delivered Cincinnati, based on freight rates of $3.25 from Birmingham and $1.20 from Ironton as follows:

	PER TON
Southern foundry No. 1	$15.75 to 16.25
Southern foundry No. 2	15.25 to 15.75
Southern foundry No. 3	14.75 to 15.25
Southern foundry No. 4	14.25 to 14.75
Southern No. 1 soft	15.75 to 16.25
Southern No. 2 soft	15.25 to 15.75
Southern gray forge	13.75 to 14.00
Northern No. 1 foundry	16.70 to 17.70
Northern No. 2 foundry	16.20 to 17.20
Northern No. 3 foundry	15.70 to 16.70
Northern 8 per cent silicon	19.70 to 20.20

Finished Material.—Specifications on contracts have shown a slight improvement and jobbers are maintaining previous quotations on orders from stock. Small orders are filled here at the following prices:

Iron and steel bars, 1.85c to 2c, full extras. Angles, 3 x 3 and over, 2.10c to 2.25c; beams and channels, 15 inches and under, 2.10c to 2.25c; small angles and architectural channels, 2c base; plates, ¼-inch and heavier, 2c; 3/16-inch, 2.10c; No. 8, 2.15c; sheets (blue annealed) No. 10, 2.15c to 2.25c; No. 12, 2.20c to 2.30c; No. 14, 2.25c to 2.35c; No. 16, 2.35c to 2.45c; box annealed sheets, Nos. 18 and 20, 2.55c to 2.65c; Nos. 22 and 24, 2.65c to 2.75c; Nos. 25 and 26, 2.70c to 2.80c; No. 27, 2.75c to 2.85c, and No. 28, 2.85c to 2.95c; boiler tubes, 2¾ to 5 inches, 62 per cent off base; turnbuckles, 45 per cent off; rivets, 3c base; cold rolled shafting, 47 to 50 per cent off list; steel tire, 2.05c to 2.10c base.

Coke.—But little change is noticeable in the market for coke. Ovens are maintaining their quotations for contract coke with satisfactory uniformity, and there are some contracts pending involving foundry supplies for the next 6 months and for the next 12 months. Spot coke is still in ample supply at irregular quotations. Contract prices in the leading coke producing districts are as follows:

	PER TON
Wise county furnace coke	$1.60 to 1.85
Wise county foundry coke	2.10 to 2.25
Pocahontas furnace coke	1.75 to 1.85
Pocahontas foundry coke	2.00 to 2.25
Standard Connellsville foundry coke	1.85 to 2.00
Standard Connellsville foundry coke	2.25 to 2.40
Connellsville district furnace coke	1.60 to 1.80
Connellsville district foundry coke	2.00 to 2.25

Old Material.—Some descriptions are receiving a little better demand and there is more inquiry from rolling mills. Stocks are ample, however, and prices are without material change. Railroads continue to offer in fairly good volume. We quote dealers' prices to melters here as follows:

Old No. 1 R. R. wrought, net tons	$11.00 to 12.00
Cast machine and fdy., net tons	12.00 to 12.50
Old iron rails, gross tons	13.50 to 14.00
Old steel rails (re-rolling) gross tons	12.75 to 13.25
Old short lengths, gross tons	12.00 to 12.50
Old iron axles, net tons	15.50 to 16.50
Heavy melting scrap, gross tons	12.00 to 12.50
Stove plate, net tons	9.50 to 10.50
Wrought turnings	5.00 to 6.00
Cast borings, net tons	4.00 to 4.50
Car wheels, gross tons	13.00 to 14.00

PHILADELPHIA.

Marked Improvement in Pig Iron Conditions.

Office of THE IRON TRADE REVIEW,
408 Central Trust Bldg., June 23.

Pig Iron.—The improving condition of the market was brought out strongly last week at the monthly meeting of the Eastern Pig Iron Association, when reports presented showed an increase in orders of 55 per cent and a decrease in stocks of not far from 25 per cent. The feeling was optimistic, and it was generally agreed that if the demand continues as at present, more furnaces will have to be blown in. Three—the Standish, the Colonial and one of the Thomas Iron Co.—have recently gone in blast, and more are expected to follow soon. There is a limit to such a movement, however, unless there is an improvement in prices, as many of the old-fashioned stacks in eastern territory cannot be operated at a profit except at a considerable advance over the present figures. Orders continue in good volume, as do inquiries, and there is no inclination to shade prices below the basis now ruling, $16.50 and $16.75 for No. 2X foundry. While no very large orders are reported, those of fair size, running from 100 to 1,000 tons, are numerous and reflect an improvement in business. Pipe men continue in the market, and some large orders from them are pending. Prices show no substantial change and may be quoted as follows:

No. 1X foundry	$17.00 to 17.50
No. 2X foundry	16.50 to 17.00
No. 2 plain	16.00 to 16.50
Standard gray forge	15.25 to 15.50
Basic	15.50 to 15.75
Low phosphorus	21.00 to 21.50
No. 2 Birmingham	16.25 to 16.75
No. 2 Virginia	16.75 to 17.25

Finished Material.—There is no essential change in the situation, buyers still holding off until they become more assured that bottom prices have been reached. Plates are in a little better demand, but orders for structural material, of which a large number are supposed to be awaiting a favorable opportunity, are still held up. Some low prices are being made on bar iron. We quote: Structural material, 1.75c to 1.90c, according to specifications; steel plates, 1.75c to 1.80c; refined iron, 1.30c to 1.35c; steel bars, 1.50c to 1.55c.

Old Material.—The market is very quiet, the prevailing dullness being accentuated by the disinclination of the mills to make purchases just before the usual inventory made in the first week of July. When this is over an improved demand is looked for. In the meantime, the market holds firm, and one or two small increases are noted, as follows:

Old steel rails	15.00 to 15.50
No. 1 steel scrap	13.50 to 14.00
Old steel axles	17.50 to 18.00
Old iron axles	20.00 to 20.50
Old iron rails	17.25 to 17.75
Old car wheels	13.50 to 14.00
Choice scrap R. R. No. 1 wrought	15.50 to 16.00
No. 1 yard scrap	13.50 to 14.00
Machinery scrap	13.50 to 14.00
Low phosphorus scrap	18.00 to 18.50
Wrought iron pipe	12.50 to 13.00
No. 1 forge fire scrap	11.00 to 11.50
No. 2 forge fire scrap, ordinary	9.00 to 10.00
Wrought turnings	9.50 to 10.00
Axle turnings, Heavy	11.00 to 11.50
Cast borings	9.00 to 9.50
Stove plates	11.00 to 11.50

BUFFALO.

Pig Iron Market Quiet, But Prices Are Firm.

Office of THE IRON TRADE REVIEW,
932 Ellicott Square, June 23.

Pig Iron.—The market during the past week has grown quieter, but that fact is not looked on as discouraging and furnace men hope for and expect better things. Their outlook is optimistic rather than being an approach in any way to the opposite. Prices are firmer and shadings on the whole less common. More and more iron is moving forward from the furnaces, but sales during the past week were fewer than for the week preceding. One order for 2,500 tons of No. 2X was booked for delivery over the third quarter at about $15.75. Several of from 100 to 500 tons have been taken at similar figures. We quote f. o. b. Buffalo as follows:

No. 1X foundry	$16.50 to 17.00
No. 2X foundry	16.00 to 16.50
No. 2 plain	15.50 to 16.00
No. 3 foundry	15.00 to 15.50
Malleable Bessemer	16.00 to 17.30
Gray forge	15.00 to 15.50
Charcoal	20.50 to 21.00

Finished Materials.—Uncertainty and hesitancy characterize the attitude of the buyers in finished lines, orders for small lots being the feature. Inquiry is out for 1,000 tons of galvanized sheets for building purposes.

ST. LOUIS.

Lull in Pig Iron Market—No Change in Quotations.

June 22.

Pig Iron.—Whether the Republican national convention in Chicago last week or other causes operated to depress the pig iron market in the St. Louis territory is not known, but it is certain that there was a lull in trading, although prices remained firm at $12, Birmingham, for No. 2, with 50 cents higher obtained in some instances. Buying for the week was very light, and there was little business placed. The furnace men have booked good tonnages for shipment over the third quarter, and are holding out for higher prices. They maintain that the buying movement will continue and some of them believe that $12.50 will be the minimum price for No. 2, Birmingham, for shipment over the last quarter. Some furnaces are holding their prices at this figure for all deliveries. Inquiries are pending in the St. Louis territory for about 1,800 to 2,000 tons, but it is uncertain whether such orders will be booked. The furnaces claim that they are moving iron from their yards as fast as it is made, and that unsold stocks in the South are at a very low ebb.

Our quotations, delivered, to which freight of $3.75 from Birmingham has been added, follow:

No. 1 southern	$16.25 to 16.75
No. 2 southern	15.75 to 16.25
No. 3 southern	15.25 to 15.75
No. 4 southern	14.75 to 15.25

Coke.—The demand for foundry coke was keener last week, but prices remained the same—$2.15 to $2.50 for selected 72-hour Connellsville, and $1.50 to $2 for the best Connellsville furnace, f. o. b. ovens. Virginia and West Virginia quotations were unchanged from the previous week. The freight rate from Connellsville and the Virginia and West Virginia fields is $2.80 to East St. Louis, $2.90 to St. Louis, and $2.40 when destined beyond.

Old Material.—Quotations remain as follows:

Cast iron borings, free from foreign material, net ton	$ 4.50
Steel axle turnings, net ton	8.00
Steel railroad axles, net ton	13.50 to 14.00
Iron railroad axles, net ton	15.50
Miscellaneous steel scrap, gross ton	10.25
Old car wheels, gross ton	14.00 to 14.50
No. 1 railroad cast scrap, net ton	11.00
Heavy machinery cast, net ton	12.00
Stove plate and light cast, net ton	10.00
Sheet iron, net ton, uncut	3.50
No. 1 railroad wrought, net ton	10.50 to 11.00
Railroad malleable, net ton	11.50
Heavy melting steel, net ton	10.00

BIRMINGHAM.

Contract For Open-Hearth Furnaces at Ensley—New Industries.

June 22.

Southern pig iron manufacturers are not forcing prices and apparently are satisfied for a while with the quotations at between $12 and $12.50 per ton, No. 2 foundry. There has not been a great activity in buying lately, but the furnace companies are confident, having sold a large tonnage for future delivery and the political situation having cleared up considerably.

The location of a number of new industries in this district are reported. Pittsburg parties will erect a fire brick works near Ensley; a cog wheel plant will be built at Ensley; the old plumbing pipe and rolling mill plant at Helena, Ala., has been purchased by Atlanta, Ga., parties and will be transformed into a cotton tie and hoop factory; bridge works will be located at Bessemer. Other industries will be landed shortly, negotiations now being on.

The big steel plant of the Tennesee Coal, Iron & Railroad Co., at Ensley, is doing nicely and the production is large. More labor is being added at the big plant. During July one thousand Italians will arrive in the district from their native country to be distributed among the works that are resuming. A contract has been let to the American Bridge Co., a subsidiary company of the United States Steel Corporation, for the erection of four open-hearth furnaces in the steel plant at Ensley, to be completed within a year.

CHICAGO.

Encouraging News From Railroads—Heavy Demand for Agricultural Implements.

Office of THE IRON TRADE REVIEW,
1328 Monadnock Block, June 23.

Conspicuous in the week's events are two developments that possess much significance to producers and consumers of iron and steel. The most important of these is that affecting the railroads which traverse the great corn and wheat belts. Quite recently, instructions were issued by several of the western trunk lines to prepare at once for the immediate rejuvenation of their tracks and rolling stock, and already specifications have been issued for a good sized tonnage of iron and steel and other equipment. Most of this material was purposely deferred until the expiration of the fiscal year, but with this period passed or almost at hand energetic efforts are under way by the railroads to be in readiness by early fall to handle the enormous traffic growing out of the movement of the crops. That the harvest this year will be a bumper one and that the activity of the railroads is no idle dream is further evidenced by the extraordinary demand for agricultural implements. The International Harvester Co. is shipping from its various plants as high as 10, 15 and 20 trainloads of machinery and implements daily, and

other manufacturers report proportionate activity. This rush of orders has developed an active demand for soft steel and iron bars. Most of the implement manufacturers have been caught with ware houses and yards bare of raw material and finished machines to an extent not experienced in many years, and manufacturing operations are being conducted night and day to overtake the demand. Mills supplying these materials have felt the impetus growing out of assured crop conditions, but in other lines the market is dull. The shut-down of plants this summer will be more extensive than usual. The Republic Iron & Steel Co. will close its East Chicago, East St. Louis and Moline mills July 1 for two weeks; and the Inland Steel Co. will cease operations July 3 in all its departments, excepting the sheet mills and galvanizing plant. The Interstate Iron & Steel Co. will continue in operation all the summer. Excepting the rail mill, all the mills of the Illinois Steel Co. at South Chicago are idle, although it is expected to start up the plate mill next Monday for a short run. The International Harvester Co. will blow in its third furnace at a very early date, instructions having been issued to start up as quietly as possible.

Pig Iron.—The market has pursued the even tenor of its slow and conservative pace in the past week. In round figures, about 10,000 tons of iron have been figured on, but only a small proportion of this was let. The orders placed range from 1,000 tons downwards, with small lots predominating. The two largest sales of the week were for 1,000 tons of malleable and 1,000 tons of 4 per cent to 6 per cent silvery. Nominally, prices are without change at $12 Birmingham for Southern No. 2 foundry, and $17.50 Chicago for northern No. 2 foundry, but close buyers can shade both these schedules. Bona fide sales have been made this week on the basis of $11.50 Birmingham for southern No. 2, and at $17 Chicago for northern No. 2. A purchase of some 3,500 tons was also made from a central western furnace on the basis of $14.50 valley, which would net valley irons in Chicago at $16.90 for either No. 2 foundry or malleable Bessemer. It is said that one local interest is openly selling its product at $17 Chicago in competition with valley irons. The market is not considered strong by large operators on either side, despite the fact that several requests have been received this month to anticipate July quotas. Fear is expressed that considerable resale iron will be offered during July and August, and in the present feeble state of the market this might have a disastrous effect. A very large tonnage was bought in the last six weeks by western foundrymen simply because the price was low, and inasmuch as shipments will commence on this in July and business has not increased sufficiently to consume this tonnage it is feared that melters will throw it back on the market at a lower price than prevailing schedules. It is positively denied by the leading implement interest that it has bought 40,000 tons of southern iron, as reported. We quote as follows:

Lake Superior Charcoal	$19.50 to 20.00
Northern Foundry No. 1	17.50 to 18.00
Northern Foundry No. 2	17.00 to 17.50
Northern Foundry No. 3	16.50 to 17.00
Southern Foundry No. 1	16.85 to 17.35
Southern Foundry No. 2	16.35 to 16.85
Southern Foundry No. 3	15.85 to 16.35
Southern Foundry No. 4	15.35 to 15.85
Southern No. 1 Soft	16.85 to 17.35
Southern No. 2 Soft	16.35 to 16.85
Southern Gray Forge	14.35 to 14.85
Southern Mottled	15.10 to 15.60
Southern Silveries, 4 per cent Silicon	17.85 to 18.35
Southern Silveries, 5 per cent Silicon	18.35 to 18.85
Southern Silveries, 6 per cent Silicon	19.35 to 19.85
Jackson Co. Silveries, 6 per cent	18.90 to 19.40
Jackson Co. Silveries, 8 per cent	20.90 to 21.40
Jackson Co. Silveries, 10 per cent	22.90 to 23.40
Malleable Bessemer	17.00 to 17.50
Standard Bessemer	18.25 to 18.75
Alabama Basic	16.35 to 16.85

Billets and Rods.—The most important inquiry pending is for 16,000 tons of rerolling billets from a western horse shoe manufacturer, 12,000 tons for delivery to the western plant, and 4,000 tons to its eastern works. The company specifies the maximum price it will pay, and as this figure is considerably lower than any mill is now quoting on such material, it is extremely doubtful if the inquiry will develop beyond the primary stage. Another inquiry for 500 tons of rerolling billets was sent out by the Kansas City Bolt & Nut Co., Kansas City, and it is believed the order went to the Pueblo, Colo., mill. There is little or no activity either in forging billets or wire rods. Prices are without change, and we quote rerolling billets $26.50 and forging billets $28.50, base Chicago. Bessemer wire rods, $33; open-hearth, $34, and chain rods, $33, all f. o. b. Pittsburg.

Plates.—Some small business has developed in the past week for universal plates for consumption in structural lines, but there is nothing doing in tank plate. The Illinois Steel Co. will start up its plate mill at South Chicago, Monday, June 29, to operate on a few accumulated orders. It will shut down again after these are rolled unless business materially improves in the meantime. The movement from local warehouses is a little brisker than it has been for some months, but it is noticeable that specifications are almost wholly for immediate consumption. Jobbers are also keeping their stocks down to a low level. We quote for Chicago delivery, as follows:

Plates, ¼-inch and heavier, 6¼ to 100 inches wide, either universal or sheared, 1.78c Chicago. For extras see Pittsburg report. Jobbers' prices for shipment from local stocks are as follows: Tank steel, ¼-inch and heavier, up to 72 inches wide, 2c to 2.10c; from 72 to 96 inches wide, 2.10c to 2.20c; 3/16-inch up to and including 60 inches wide, 2.10c to 2.15c; 72 inches wide, 2.35c to 2.45c; No. 8, up to 60 inches wide, 2.10c to 2.15c. Flange and head quality, 25c extra.

Sheets.—Sheet business is very quiet, and those manufacturers and jobbers who are endeavoring to maintain the schedule of the leading producer report they are losing more than their share of the tonnage coming forward. It is stated that some of the smaller independent mills are shading prices $1 a ton in the effort to keep their plants in operation. The Inland Steel Co. will operate its sheet mills and galvanizing department throughout the summer, although its output has been reduced to 25 per cent of its capacity; but all the other departments of this plant will shut down July 3 for the balance of the month. Jobbers report a normal business, but as they are making no effort to replenish their depleted piles, it is evident their faith is not buoyed by any hope of early improvement. For mill prices, see Pittsburg. We quote for delivery from local stocks, as follows:

No. 10, 2.15c to 2.25c; No. 12, 2.20c to 2.30c. No. 14, 2.25c to 2.35c; No. 16, 2.35c to 2.45c; Nos. 18-20, 2.60c to 2.65c; No. 22-24, 2.65c to 2.70c; No. 26, 2.70c to 2.75c; No. 27, 2.75c to 2.80c; No. 28, 2.85c to 2.95c; No. 30, 3.25c. Galvanized sheets, No. 10 to 16, 3.05c to 3.15c; Nos. 18 to 20, 3.15c to 3.25c; Nos. 22 to 24, 3.30c to 3.35c; No. 26, 3.50c to 3.55c; No. 27, 3.70c to 3.75c; No. 28, 3.90c to 4.00c; No. 30, 4.40c to 4.50c.

Structural Steel.—The total business of fabricating contracts closed by the entire western division of the American Bridge Co. last week, did not exceed 200 tons. This is pretty near the smallest week's business for this territory in the history of the company. The largest contract of the week went to the King Bridge Co., Cleveland. It was let by the city of Chicago, and provided for the construction of the Erie street bridge. The amount of material involved is 1,600 tons. The company's figure is $126,800. Hansell-Elcock & Co., of Chicago, secured the contract for the

erection of the new barns at Sixty-ninth street and Ashland avenue for the Chicago City Railway Co., the amount of steel required being 500 tons. The Minneapolis Steel & Machinery Co. also secured the order for the converter building let by the Balaklala Consolidated Copper Co., 125 tons; and the Springfield Boiler Works, Springfield, Ill., landed the order for the 140 tons of pen stocks let by the Central Colorado park commission. Bids were opened last week for the Echkart warehouse to be erected in Chicago, the tonnage required being 1,900, and three jobs are pending in San Francisco, involving 600, 650 and 850 tons, respectively. The market remains in a weak condition, although prices are not being cut to the degree that was experienced a month or so ago. We quote as follows:

Beams and channels, 3 to 15 inches, inclusive, 1.78c to 1.81c delivered Chicago. For extras see Pittsburg report. Quotations from store are as follows for carload lots and over:

All angles, 3 inches and larger, including 6 inches, $1.95 per 100 pounds; angles over 6 inches, $2.05 per 100 pounds base; beams, 3 to 15 inches, inclusive, $1.95 per 100 pounds, base. channels, 3 inches and larger, $1.95 per 100 pounds, base. Less than carload lots are $1 a ton higher than foregoing prices.

Rails and Track Supplies.—Some high tee rails and about 100 tons of light rails per day represent the rail tonnage placed here in the past week. There is nothing doing of any moment either in heavy rails or track supplies. The local mill continues to operate to full capacity, however, its weekly specifications being sufficient to insure this condition throughout the summer. All the other rolling departments of the mill are idle. We quote as follows:

Standard rails, $28 f. o. b. mill, full freight to destination; light rails, 25-pound to 45-pound, $28; 20-pound, $29; 16-pound, $30; 12-pound, $31. Track supplies, f. o. b. Joliet, angle bars, 1.50c to 1.60c; spikes, 1.80c to 1.90c; track bolts, with square nuts, 2.20c to 2.25c; with hexagon nuts, 2.35c to 2.40c. Small railroad and square boat spikes, 1.90c base, f. o. b. Chicago.

Cast Iron Pipe.—The most encouraging symptom of the week's orders is one for 1,000 tons of culvert pipe from a northern railroad which was let to the United States Cast Iron Pipe & Foundry Co. In addition, the same interest has secured contracts for 2,000 tons of gas pipe from various gas companies, as well as contracts from Springfield, Minn., for 400 tons; from Terre Haute, Ind., 200 tons; Stillwater, Minn., 100 tons; Lafayette, Ind., 100 tons; and Anderson, Ind., 300 tons. Neither the Berywin, Ill., contract for 1,200 tons, nor the Newark, O., order for 1,800 tons has been let as yet. Prices are without change, and we quote for Chicago delivery, 4 to 6-inch pipe, $27; 6 to 16-inch, $26; larger sizes, $25; gas pipe $1 a ton higher.

Merchant Pipe and Boiler Tubes.—Jobbers have taken out a little material this past week, but the tonnage received by mills serves only to emphasize the lack of faith by consuming interests in the permanency of present prices rather than any belief of a stationary or upward market. This is the dull season of the year anyway, and no transactions of any consequence are expected until the passing of midsummer. We quote mill discounts, Chicago delivery, carload lots, as below. On steel pipe jobbers are allowed a concession of one point and 5 per cent additional from the schedule in force.

	—Steel—	
	Black.	Galv.
¾ to 6 inches, inclusive.....	73.2	63.2
7 to 12 inches, inclusive.....	70.2	55.2

BOILER TUBES.			
	Steel.	Iron.	Seamless.
2¾ to 5 in., inclusive....	63.2	50.2	50.2

Mill quotations on iron pipe are three points higher than the foregoing prices.

We have revised our prices from store, as below. A concession of one-half to one point from these prices is allowed by Chicago jobbers on carload orders shipped from local stocks. We quote for less than carload lots as follows:

MERCHANT PIPE.

	—Steel—	
	Black.	Galv.
⅛ to ¼ inch.....	65	49
⅜ inch	67	53
½ inch	69	57
¾ to 6 inches.....	73	63
7 to 12 inches.....	69	54

Store prices for wrought iron pipe, carload lots, from Chicago stock, are as follows: One-eighth to ¼-inch, 61c; ⅜-inch, 63; ½-inch, 65; ¾-inch to 6 inches, 70; 7 inches to 12 inches, 67. Boiler tubes from store are unchanged.

Wire Products.—A normal business is reported in nails and fencing, but both barbed and plain wire are dull Midsummer trade in wire products is always light and present conditions are no criterion to judge the market by. It is a fact, nevertheless, that stocks in jobbers' warehouses are low, and likely to remain so until after the harvesting of this year's crops. It is the prevailing opinion that farmers have been parsimonious in their purchases this spring, and its effect is seen in the demand for all iron and steel products entering into agricultural consumption. The American Steel & Wire Co., however, has started up its horseshoe department at the Schoenberger Works, Pittsburg. Prices are without change, as follows, Chicago delivery:

Wire nails, $2.13; painted barb wire, $2.28; galvanized barb wire, $2.58; smooth annealed wire, $1.98; smooth galvanized wire, $2.28; polished staples, $2.23; galvanized staples, $2.53. Carload lots to retailers, 5 cents higher; less than carload lots, 15 cents higher.

Coke.—No change is noted in the demand for coke. Trading is necessarily restricted owing to light furnace and foundry operations, but manufacturers show no disposition to recede from the price of $2.25 for Connellsville foundry coke, and $1.90 to $2 for furnace coke, all f. o. b. ovens.

Merchant Bars.—Specifications for iron bars have been freer this week than for some time past. This improvement is due in large measure to the notice issued by some of the large western roads to put in repair at once all the cars and engines reported in bad condition that they may be in shape for instant use in handling the expected heavy traffic growing out of the movement of crops this fall. Furthermore, the passing of the fiscal year of many of the local roads has brought out a budget of requirements that seems large in comparison with the meager purchase of the past several months, but which is only a passing indication of the large tonnage which will be required when business confidence returns to normal. Nevertheless, the bar iron mills of this locality are immensely encouraged over the turn of affairs, and look for a steady, if slow, improvement from now on. The situation on steel bars is much complicated. Western mill men emphatically deny the statement that approximately 250,000 tons of new business has been placed with the makers of this product for delivery in the ensuing fiscal year, and for proof of this point to the figures of their own sales, which are far below this tonnage. As indicated in THE IRON TRADE REVIEW last week, a large part of the announced contracts are old contracts rewritten at the reduced price. The west greatly exceeds any other section of the country in its output of agricultural implements, yet the contracts placed with the Illinois Steel Co., the largest producer of soft steel bars in this territory, since the reduction in price was made, do not

exceed 40,000 tons. The figures of other local mills are much below these, but are in fair proportion to their output. The entire agricultural implement trade does not consume more than 300,000 tons of steel bars annually, and it must be remembered that the mills carried over from last year a larger undelivered tonnage than they have had on their books at the end of the fiscal year in a decade. It is true the season's buying opened with a rush, but quite a number of interests were deterred from placing contracts by the rumor that gained currency that certain implement interests had been granted an inside price. There is not a scintilla of truth in this report, and it is positively stated on all sides that there will be no further reduction in this product this year. The foundation for the rumor is attributed to a transaction made by the Republic Iron & Steel Co. for the shipment of a large tonnage of hard steel bars rolled from old rails at its Moline, Ill., mill, the price of which was below the then market schedule. Since this contract was closed, hard steel bars have materially strengthened in sympathy with the rising price of rerolling rails. Local mills are now asking from 1.40c to 1.45c Chicago, half extras. There has been a good demand for hard steel in the last few weeks, both for agricultural consumption and reinforcing concrete work. Bedstead makers have also been sounding the market liberally of late. The St. Louis office of the Steel Corporation closed an order last week with a local concern for 30,000 tons of reinforcing bars, and more tonnage is expected from the same firm. There is also an inquiry pending for the same material in the Chicago market for between 4,000 and 5,000 tons. We quote as follows:

Bar iron, 1.50c to 1.53c; soft steel bars and bands, 1.58c, half extras; soft steel angles, less than 3 x 3, 1.68c; hoops, 1.98c base, full extras; planished or smooth finished tire steel, 1.78c; iron finish, up to 1½ x ½-inch, 1.73c; base tire card, iron finish, 1½ x ½-inch and larger, 1.58c; base, steel card; channel for solid rubber tire, ¾ to 1 inch, 2.08c, and 1⅛-inch and larger, 1.98c; smooth finished machinery steel, 1.83c; flat sleigh shoe, 1.63c; concave and convex sleigh shoe, 1.83c; cutter shoe, 2.05c; toe calk steel, 2.13c; railway spring, 1.93c, base steel card; vehicle spring steel, 1.98c base, vehicle card; crucible tool steel, 7c to 9c, with higher prices asked on special grades. Quotations on shafting are 56 per cent off the list for carload lots, and 52 per cent off for less than carload lots, carload freight allowed to points in base territory. On iron and steel bars from local stocks, we quote as follows: Bar iron, 1.90c to 2c, full extras; soft steel bars, $1.80 per 100 pounds base, plus half extras; soft steel hoops, 2.30c, full extras.

Old Material.—The untimed boom of the last two weeks, which boosted prices to a level out of proportion with other products, has flattened out like a collapsed balloon. As is the case with all speculative advances, the market today is in a feebler state than before the upward movement started. It was essentially a dealers' market, and they are about the only people who have suffered by the collapse. Scrap is being offered today at from 50 cents to 75 cents a ton less than what the same material was eagerly bought at 10 days ago, and it is even difficult to find a buyer at the reduced price. One large local mill which bought heavily of rerolling rails when the advance started, mistaking the movement for a firm improvement in values, is endeavoring to dispose of its purchases at a little less than it bought at, but not with much success. The shrinkage has hit hardest the more popular materials, but all grades of scrap are affected to a greater or lesser degree. All trading is at a minimum, dealers and consumers resting on their oars and awaiting further developments before recommencing active operations. We have revised our prices and quote gross tons in the first paragraph as follows:

Old car wheels	$13.00 to 13.50
Old iron rails	15.50 to 16.00
Re-rolling rails (3 ft. and over)	14.25 to 14.75
Old steel rails (3 ft. and under)	12.50 to 13.00
Light section relayers, 45 lbs. and under, subject to inspection	21.00 to 23.00
Relaying rails, subject to inspection	19.00 to 19.50
Frogs, switches and guards	11.75 to 12.25
Heavy melting steel	11.50 to 12.00

We quote, net tons, as follows:

No. 1 R. R. wrought	$12.00 to 12.50
No. 2 R. R. wrought	11.00 to 11.50
Knuckles, couplers and springs	11.50 to 12.00
Shafting	14.50 to 15.00
Iron car axles	16.50 to 17.00
Steel car axles	15.00 to 15.50
Dealers' forge No. 1	9.50 to 10.00
Pipes and flues	8.50 to 9.00
No. 1 cast, 150 lbs. and less	12.25 to 12.75
No. 1 mill	7.00 to 7.50
Mixed busheling (Nos. 1 and 2)	7.00 to 7.50
Country sheet	4.50 to 5.00
No. 1 boiler cut	8.00 to 8.50
Boiler punchings	10.00 to 10.50
Cast borings	5.00 to 5.50
Mixed borings, etc	5.00 to 5.50
Machine shop turnings	5.50 to 6.00
Railroad malleable	11.25 to 11.75
Agricultural malleable	10.25 to 10.75
Stove plate and light cast scrap	10.25 to 10.75
Old iron splice bars	14.25 to 14.75

A number of striking molders returned to work June 15 at the former wage scale at the Dunkirk, N. Y., plant of the United States Radiator Co.

METAL MARKET

NEW YORK.

June 23.

Copper.—In keeping with lighter transactions abroad, the domestic copper market has been comparatively inactive, though maintaining the price level of a week ago without difficulty. We quote: Lake, 12⅞c to 13c; electrolytic, 12⅝c to 12⅞c; casting, 12½c to 12⅝c.

Pig Tin.—The foreign market is not active and the local market has reflected this condition. Transactions are small. We quote, New York delivery, 27½c to 28c.

Pig Lead.—The market is steady at unchanged prices, with a brisk volume of business. We quote, New York delivery, at 4.47½c to 4.52½c.

Spelter.—Little effort is being made to put through sales and prices are nominally on about the same level as a week ago, 4.52½c to 4.57½c, New York, though the market is weaker.

Antimony.—We quote: Cookson's, 8⅝c to 8¾c; Hallett's, 8½c to 8⅝c; ordinary brands, 8c to 8¼c.

CHICAGO.

June 23.

Politics has interferred to a large extent with sales of metal in this market during the current week. Trading was not even up to normal proportions but a better condition is anticipated in the immediate future. Prices are without noticeable change, and we quote as follows:

Lake copper, 13½c to 14c; casting, 13¼c to 13½c; pig tin, 32c to 32½c; spelter, 5.10c to 5.25c; pig lead, desilverized, 4.60c to 4.75c in 50-ton lots; corroding, 4.75c to 4.85c in 50-ton lots; car lots, 2½c per 100 pounds higher; sheet zinc, 7c list, f. o. b. LaSalle, in car lots of 600-pound casks; Cookson's antimony, 11c to 11½c; other grades, 10c to 10½c.

The demand for old metals is also without improvement, and dealers have not materially changed their schedules. Current quotations are as follows:

Copper wire 10½c; heavy copper, 10½c; light copper, 9½c; heavy red brass, 10c; heavy yellow brass, 8c; light brass, 5½c; No. 1 red brass borings, 8½c; No. 1 yellow brass borings, 7½c; brass clippings, 8c; tea lead, 3¼c; lead scrap, 3½c; zinc, 3¼c; tin pipe, 25c; tin foil, 22c; pewter, 17c; electrotype plates, free from wood, 4c; electrotype dross, 2¼c; stereotype plates, 4½c; stereotype dross, 3c; prime slab zinc, $62 per ton.

ST. LOUIS.

June 22.

Lead and Zinc.—The output of zinc in the Joplin district was seriously restricted last week by heavy winds and rains, resulting in a stampede for ore, with indications pointing toward an equally great competition this week. Quite a number of producers refused to accept the offerings of last week, and the salable ore was low in quantity at the close.

An advance of 50 cents marked the high price, but the base price was advanced on a large proportion of the shipment from $1 to $2 a ton. Ore which sold the previous week on a $34 and $33 base price, bringing a $35 base price as a general thing during last week.

The lead market developed just as keen competition as zinc, and a further advance of $1.50 a ton was made over the previous week, and another $1.50 a ton advance bid for this week's delivery. The St. Louis Smelting & Refining Co. came back to the Picher Lead Co., which made the raise a week ago.

DEATH OF WM. B. LEEDS.

A cablegram received in New York, June 23, announced the death of William B. Leeds, financier, former tin plate manufacturer and railroad president. Mr. Leeds was born in Richmond, Ind., in 1861. He went into the tin plate business in 1895 with Daniel G. Reid, building a four-mill plant at Ellwood, Ind. This plant was added to until it had about 20 mills. In 1898, Reid and Leeds, with W. H. and J. H. Moore, of Chicago, were instrumental in promoting the formation of the combination named the American Tin Plate Co., but kept in the background, the principal public work of the project being done through F. F. Wheeler. At the election of officers, Reid was made president, and Leeds first vice president. Their plant of 20 mills at the time was one of the four largest that went into the combination. They purchased a plant at Montpelier, Ind., operated it for a short time, and then moved it to Ellwood, Ind. When the United States Steel Corporation was formed in 1901, the American Tin Plate Co. was absorbed and Mr. Leeds ceased to be a factor in the tin plate business. The plant that was the Leeds plant is now the American works of the American Sheet & Tin Plate Co., of 28 mills, at Ellwood, Ind. After retiring from the tin plate business, Mr. Leeds devoted himself largely to the railroad business, and was president of the Chicago, Rock Island & Pacific until three years ago. He had other important interests.

IRON DEMAND SLOW.

But Milwaukee Manufacturers Find Business Generally Improving.

Milwaukee, Wis., June 22.—Milwaukee iron and steel men are of the opinion that the reduction in steel prices has not improved the trade situation in the city as much as anticipated. While there has been a slight revival, the demand for iron is slow and contracts are developing slowly. Pig iron sales are confined to small shipments, however, and the market continues to be rather quiet and steady. Agricultural implement manufacturers of Milwaukee are experiencing excellent demand owing to the favorable crop prospects in Wisconsin and these manufacturers have been the heaviest buyers in soft iron the past week.

The Northern Smelting & Mfg. Co., with a capital stock of $100,000, has taken over the only plant in Wisconsin for the making of pig lead, the Northern Smelting Co., at Waukesha, Wis. Main offices of the company are to be located in Milwaukee and the officers are: James H. Spence, president; R. N. Tufford, vice president; W. H. Dagget, secretary; C. A. Bowker, treasurer, and S. L. Brown, superintendent.

Stevens Point, Wis., is making an effort to promote the Pioneer Ornamental & Structural Iron Co., which is endeavoring to rent for a term of three years the foundry and machine shops of the Central City Iron Works. The sum of $1,500 is being raised by the citizens of Stevens Point for the purpose.

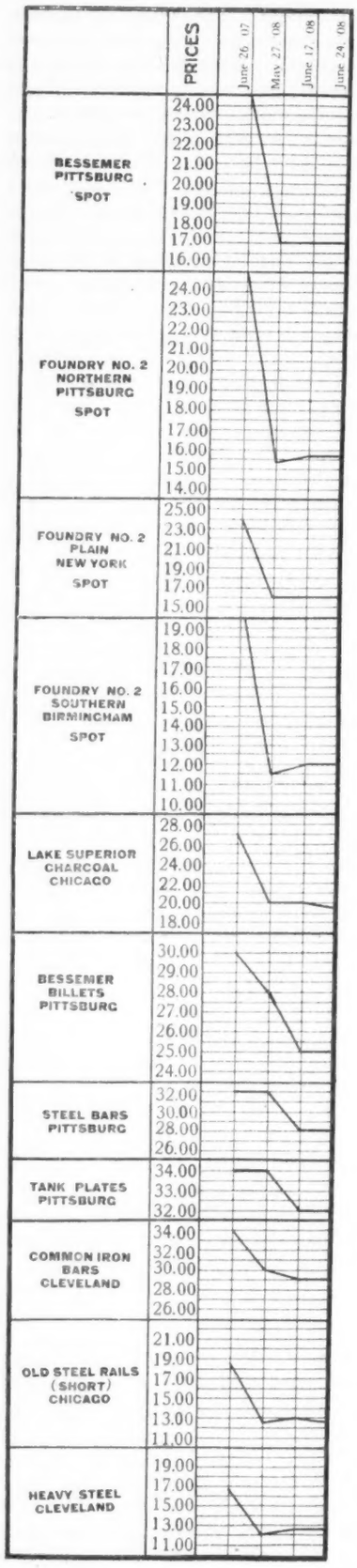
The Nortmann & Duffke Foundry Co., Milwaukee, recently suffered the loss by fire of the pattern vaults, containing valuable patterns. The building was covered by insurance, but the loss to the patterns is total. The plant will be hampered for some weeks until the work of replacing the patterns is completed.

The Filer & Stowell Co., Milwaukee, has received orders for three large Corliss engines for the equipment of the power plant at the United States naval station being established at North Chicago.

The Gerlinger Steel Casting Co., Milwaukee, is building a fireproof storehouse for patterns. The structure will be of cement block construction.

The Southern Steel Co.'s reorganization committee has granted an extension of time under which assenting stock may be deposited to July 1.

PRICE CHART.



NEW CONFERENCE DATE.

Bar Mill Owners and A. A. Workmen Will Discuss Proposed Reductions.

A futile effort to compromise upon a revised scale of wages which would be in force for the year beginning July 1, was made at a conference between the officials of the Republic Iron & Steel Co. and the wage committee and national officials of the Amalgamated Association of Iron, Steel & Tin Workers at the Hotel Henry, Pittsburg, June 22.

The Republic officials demanded a material reduction of the present boiling rate and the finished scale, which the workmen rejected. In turn the Amalgamated Association presented a counter proposition, granting, it is understood a 25-cent reduction of the boiling rate which on the sliding scale basis was $6.12½ in May and June, and in addition, approximately a 3 per cent decrease in the finishing scale. The employers declined to accept this proposal and the conference ended without results.

The following official statement as to the outcome of the conference was issued by the Republic company:

A conference was held June 22 at the Hotel Henry, Pittsburg, betwen the officials of the Republic Iron & Steel Co. and the national officials and scale committee of the Amalgamated Association of Iron, Steel & Tin Workers, to consider a scale of wages for the year commencing July 1, 1908. The officials of the Amalgamated Association presented a scale contemplating a slight reduction in wages as compared with the scale expiring July 1. On behalf of the Republic Iron & Steel Co., a scale of wages was proposed which was considered by the officials of the company to be fair in view of the general business conditions, contemplating a reduction in the scale, this reduction being intended to restore wages to the level existing during former periods when present selling prices were in effect and taking account of former advances in the different operations. As no agreement was possible, the meeting adjourned without date.

The present wage agreement between the Republic Iron & Steel Co. and the Amalgamated Association expires at midnight, June 30. In the event that no new wage scale between the company and the men is agreed to before that time, which seems assured, the Republic mills may go on an "open shop" basis unless the continuous working agreement is called into effect. This provides that in the event that the new wage scale has not been accepted by both parties up to the time of the expiration of the old scale, the mills shall continue to operate and the men to work under the terminating agreement until the new scale is fixed by conciliation.

The Republic company, however, sometime ago repudiated the continuous working agreement with the Amalgamated Association and it is not likely that it will take advantage of this extension, even though it may still do so by continuing to employ the men under the scale despite its former abrogation of the agreement.

An interesting situation seems likely, therefore, to prevail July 1 when the present wage scale expires. However, it is announced that the annual inventory of its properties pending the issuance of its report to the stockholders will be taken by the company about July 1 and the indications are the mills will be idle for several weeks at that time on this account.

Following the fruitless conference between the Amalgamated Association and the Western Bar Iron Association at Cambridge Springs, Pa., several weeks ago, a second conference has been arranged to be held by these two organizations at Detroit, July 7. Under the continuous working agreement under which the mills and the men will then be acting, the 1907-8 scale having terminated June 30, the wage matter should be referred to a sub-committee of three members each, who if necessary may call in a single conciliator to make a decision. However, it is stated, should either side desire through a technicality the problem may be referred back to the full scale committee of the men and all the representatives of the mills who will be present and the original conference begun anew.

On Thursday, June 25, at Pittsburg, the sheet and tin plate committee of the men will meet with the officials of the American Sheet & Tin Plate Co. and then fix the annual agreements as to these products.

At the annual meeting of the Brier Hill Coke Co., held at Uniontown, Pa., June 18, the following officers were elected: President, H. H. Stambaugh; vice president, R. C. Steese; secretary and treasurer, Thos. McCaffrey; directors, Geo. Tod, Henry H. Stambaugh, R. C. Steese, J. G. Butler Jr., L. W. Fogg and Geo. Howels.

The Standard Iron Co. has completely overhauled its blast furnace at Goodrich, Tenn., and expected to blow in June 15. A complete new charging system has been installed, using bins, tram and Miller top. The tram system was installed by the C. W. Hunt Co., New York City.

Judge Hazel of the federal court has decided in favor of the Babcock & Wilcox Co. in its action to recover 10 boilers delivered for sale to the New York State Steel Co., Buffalo, permission also being granted to perfect the sale, if desired, according to the terms of a previous order authorizing a 25 per cent payment to creditors.

NINE MONTHS' DEFICIT

Reported by the Crucible Steel Co. of America Reaches $650,000.

The following official statement of accounts of the Crucible Steel Co. of America has been made for the nine months ending May 31, 1908:

Profits and losses from operations after charging all expenses incident thereto, including those for repairs and maintenance of plants, interest and fixed charges:		
September, 1907, profit		$139,356.06
October, 1907, profit		174,202.73
		$313,558.79
November, 1907, loss	$13,865.48	
December, 1907, loss	56,729.40	
January, 1908, loss	23,070.13	
February, 1908, loss	42,324.86	
March, 1908, loss	31,912.54	
April, 1908, loss	14,988.14	
May, 1908, loss	36,279.54	
		219,170.09
		$ 94,388.70
Add—Income from investments		4,800.00
		$ 99,188.70
Deduct—Amount set aside as reserve for contingencies		5,836.01
Total net profit for the nine months before charging off adjustments in inventory values		$ 93,352.69
Amount charged off in adjustments of inventory values, from November, 1907, to May, 1908	$498,791.62	
Dividend No. 21, paid Dec. 31, 1907, 1 per cent on preferred stock	244,365.00	
		743,156.62
Deficit for the nine months		$649,803.93
The surplus as of Aug. 31, 1907, was		$ 457,283.81
The surplus as of May 31, 1908, was		1,807,479.88
Reduction of		$ 649,803.93
Unfilled contracts and orders on hand Aug. 31, 1907		101,910 tons
Unfilled contracts and orders on hand May 31, 1908		70,866 tons
Reduction of		31,044 tons

The condition of the company's plants has been fully maintained, $351,686.19 having been charged against the operations of the nine months.

No Indictments Returned.—After hearing the evidence in the case of the iron and steel concerns that were named in the Boston finance commission's report a few weeks ago as banded together to defraud the city, by collusion on bids for contract work, the federal grand jury last week failed to return an indictment.

The annual meeting of the Bessemer Lime Stone Co. took place at Bessemer, Pa., June 17, and resulted in the choice of the following officers: President, J. G. Butler Jr.; secretary, C. C. Blair; treasurer and general manager, Chas. M. Crook; directors, Geo. Tod, H. H. Stambaugh, W. B. Schiller, J. G. Butler Jr., J. B. Dubois and W. B. Hubbard.

THE IRON TRADE REVIEW

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OUR MARKET REPORT POLICY.

An Ohio subscriber writes us as follows:

We are greatly pleased with THE IRON TRADE REVIEW and its manner of giving the market reports. There is only one suggestion that we could possibly make and that is that, as your leading contemporary leans absolutely toward the merchant, we would suggest that THE IRON TRADE REVIEW lean a little bit more toward the interests of the manufacturer, and thus off-set the harm that your contemporary does in its anxiety to have prices reduced.

While THE IRON TRADE REVIEW is glad to receive suggestions from any of its subscribers it cannot concur in the view expressed by our correspondent just quoted. It is our constant endeavor to avoid being the organ of either manufacturers, jobbers or consumers, or to represent any particular class of buyers or sellers, but to present the facts as nearly as we can ascertain them in regard to the market and broadly represent all interests connected with the iron and steel business. In our editorial columns, we advocated the policy of the leading manufacturers to maintain prices, not because we were the representatives of any special interest, but solely because we believed that the welfare of the entire trade demanded the prevention of the disastrous price cutting of previous periods of depression. THE IRON TRADE REVIEW is not controlled by any interest in the trade and will favor none to the detriment of any other. If we were to follow any other course, the value of our paper to all concerned would instantly deteriorate.

SOME ENCOURAGING SIGNS.

Indications favor an awakening in general business at the beginning of the second half of the calendar year. July 1 is a particularly important period in business affairs and is especially so this year. It may be suggested that during the depression of the past six months the railroads and their curtailed purchases have been held up to view as of more importance to the iron and steel industry than any other factor; and the iron and steel interests have watched with much concern for a return of railroad purchasing. It is reasonable to expect considerable in the way of buying by this great interest in the second half of the year and for the reason, first, that the fiscal years of railroad companies end on July 1, and purchasing agents have been deferring order placing until that period has been passed. Second, it is the beginning of the crop movement season and winter wheat will likely be under transportation to the markets early in July. The June report of the department of agriculture represents a condition forming a basis for expectation of about 100,000,000 bushels more wheat than last year's harvest record, or 85,000,000 bushels, equal to 13 per cent more than the annual average for the past five years. While the area sown to oats falls a little short of last year, the condition of the crop, according to the June report, makes it possible that results may exceed any previous year in total yield. The movement of fruits from the south to northern markets is far in excess of last year and it is reasonable to assume that the revenues from the traffic practically in sight will encourage railroads to resume buying.

It has been noticed that the cash demand for hog products has improved, the export movement has increased, and merchants in manufacturing centers are taking hold more freely, notwithstanding the statistical position of the stocks of meats, which indicate large holdings. It is expected that the movement of coal by way of the lakes to the northwest will steadily increase during July, which will help the coal mines to operate more freely and furnish some tonnage to the railroads.

The political situation is more clear as the candidate of one great party is now named, and the other candidate is practically assured.

Investments in municipal bonds and other low interest paying investments have almost absorbed the supply of this class of securities, and it is not unreasonable to expect that with improved business conditions investors will be less timid, especially as industrial stocks and new enterprises offer opportunities which under normal conditions would seem unusually attractive. Sales of agricultural implements in the last 30 days have exceeded expectations.

The above are plain statements of conditions in business affairs which argue for improvement in the last half of the year.

THE PROSPECTS FOR STEEL DEMAND.

During the three-year period of intense activity, the question was often asked: "Where is all the iron going to?" Lately there has been a tendency to ask instead: "Where will the demand come from?" The reversal illustrates how quickly the personal viewpoint changes merely from the change in the passing phenomena. It was hard to see how 25,000,000 tons of pig iron could be required in 1906 or 1907, when 18,000,0000 tons had seemed like an enormous tonnage only four years earlier, and now it appears hard for some to realize that such a demand, or a still greater demand, can be realized in the future. It is not

difficult, however, to take a look into the future and see whence demand for enormous tonnages of steel must necessarily come.

As has been pointed out frequently of late, the great bulk of steel made does not pass into consumption, but passes into utilization. It is by reason of this that such great fluctuations sometimes occur in the demand for steel. If the steel were currently consumed, the demand would necessarily be much more regular. The exception tests the rule, and there is an exception in steel which furnishes an excellent test of this one. Of all the branches of the steel trade, the tin plate branch has of late been the most active. About the middle of February, the tin plate mills reached 75 per cent of full normal activity, and about the beginning of May substantially full normal output was reached. No other branch of the steel industry has done this. The great bulk of tin plate produced has a life, in its normal employment, of less than a year, after which life it is entirely lost or is put to a totally different use, so that tin plate is actually consumed, and quickly at that, furnishing the exception which tests the rule.

In the long run, steel will be demanded in many channels which now employ other material, and besides this there are the depletions in the store which must be met, although the restoration can be postponed for a short time in a period such as the present. For instance, the railroads are not replacing rails at present as fast as they are wearing out. The present rate of wear on rails is certainly much more than half as much as it was at the maximum point last year, while the rate of rail replacement is much less than half. This lost ground must be recovered later. There are about 315,000 miles of track owned by the public railroads. Ultimately substantially all will have to be laid with 100-pound rails, which will put into service just 50,000,000 tons of steel rails. At an average life of 10 years, replacement alone will call for 5,000,000 tons a year, and while say 4,000,000 tons of worn rails will be taken up, to be reworked into other forms, the requirements for new track will help to balance this.

To lay this trackage in steel ties of the most accepted form now in use would require some 60,000,000 tons. Only one important objection has been made to this tie, and that is that it is too light. The obvious remedy is to make it heavier, so that we may count upon 75,000,000 or 100,000,000 tons of steel for this purpose. The only reason the tie was made too light, if it is so, was because wooden ties were relatively cheap and steel relatively dear. The cost of wooden ties is increasing year by year, and if the steel industry needs the tonnage, it will meet the proposition half way and sell the steel more cheaply, so that this problem will solve itself.

There are nearly 2,000,000 wooden freight cars in existence. Allowing for the iron and steel in them, it will require 30,000,000 tons of pig iron in addition to replace them with steel cars. There are nearly 50,000 passenger, mail, express and baggage cars, to replace which with steel cars will call for 2,500,000 tons of pig iron in addition, and this work will be of especial benefit to the steel industry because a considerable part of the steel will have to be worked up into the light forms of sheets, small angles, etc.

About three billion board feet of shingles are consumed annually in the United States. Ultimately this use must be supplied by metals in which tin plate must take a prominent place. Lath take about a billion board feet a year, and will be replaced by sheet steel or wire lath. More than a million board feet go into cooperage stock, and for much of this use wood will have to yield to steel.

These bare figures show the possibilities but they do not furnish an adequate conception in tons of steel. A rough idea of the possibilities of steel replacing wood may be gained by the following statement: The United States Forest Service estimates that railroad ties comprise only about 8 per cent of the total wood used in the United States, yet our estimate just made shows that the replacement of wood by steel in this work will mean between 60,000,000 and 100,000,000 tons of steel.

As large buildings are now constructed of steel or steel and concrete, it may be expected that small buildings, even dwelling houses, will ultimately fall into line. The form of structure will be somewhat different, small shapes being used, with fastenings designed to be handled by the ordinary contractor, without rivets, and perhaps without bolts. These small sections and fastenings, with metallic lath, and perhaps with steel sash and frames, will make much more work for the rolling mills, proportionate to tonnage, than the heavy forms such as rails and large structural shapes.

Altogether it is not difficult to see hundreds of millions of tons of steel demand for the next few decades, and the principal governing element will be the relative costs of the competing materials. As the present rate of drain on our forests points to an ultimate life of only from 10 to 20 or 25 years and as concrete construction, generally requiring some steel, is constantly being made cheaper, the drift is quite clear.

Large Order for Cars.—The Youngstown Car Mfg. Co., Youngstown, O., has recently taken an order for 200 all-steel coal mining cars of three tons capacity for the Monongahela River Consolidated Coal & Coke Co. at Pittsburg. The same Youngstown concern is arranging to deliver at San Francisco 20 standard freight cars for the Honolulu Iron Works Co. These cars will have a capacity of 80,000 pounds.

A New Department.—The R. D. Nuttall Co., Pittsburg, announces the establishment of a new department to be devoted exclusively to the manufacture of gears and pinions for air compressors. The department will be equipped to turn out gears and pinions for the standard types of compressors upon short notice, and to better accommodate the users of compressors will carry a complete assortment from which immediate shipment can be made.

STEEL RAILS.

(Continued from first page.)

the various government laboratories and the numerous standing committees of the society by means of correspondence, visits and by making the laboratory facilities available, if feasible, for purposes of investigation in connection with subjects under consideration by these committees was also discussed and, to acquaint the heads of the various government branches concerned with the general tenor of matters taken up at this conference, letters were addressed to them, inviting their co-operation. The replies expressed a general and highly gratifying desire to co-operate with the society in the direction indicated. The immediate effect is seen in the marked enrichment of the program of the present meeting by contributions from representatives of various government bureaus. In a paper entitled "Testing is Not Inspection," W. A. Aiken directed attention to the fact that tests alone, such as are usually made of various materials, does not infer its rigorous inspection, and cited the rolling of steel where a single test piece is taken as representive of the quality of tons of steel, which, in the subsequent rolling, is subjected to treatment which may change its structure considerably. In the discussion of this paper, it was pointed out that consumers should be given every opportunity of learning all about the material they are using and that the tests should by no means be confined to chemical analysis alone. Robert W. Lesley said that by admitting the inspectors of cement consumers into his cement plant and by affording them every opportunity to follow and oversee the various operations, the output of cement of poor quality has been reduced and the advancement in manufacturing methods has been rapid. He closed by stating that testing is not inspection and if there would be more rigorous inspection of the materials in the processes of manufacture better testing would follow. The committee on standard specifications for cast iron and finished castings reported that the society's specifications for cast iron pipe have been adopted with few minor changes by the American Water Works Association. The report also recommended that this committee be authorized to co-operate with the American Foundrymen's Association for the purpose of eliminating grades and numbers from the standard specifications for pig iron and to substitute chemical analysis instead. The recommendation was unanimously carried.

Thomas D. West, Sharpsville, Pa., followed with a paper which described a new method for obtaining a uniform chill in rolls. It was suggested that this process might be applied to the manufacture of car wheels to insure absolutely uniform diameter and chill.

H. M. Wilson reported on the full investigation conducted under the supervision of the Geological Survey. This work is being carried on to ascertain the best fuel deposits owned by the government, so that a proper valuation can be placed upon the average. The prevention of waste in mining, and the inspection of coal purchased by the government have also received consideration. To ascertain the coking value of western coal a plant equipped with a washer was erected in Denver and the results showed that good coke could be made of all but three of 44 samples tested. The study of the origin of coal is also under way and the 600 tests already made indicate that oxygen is as deleterious to coal as ash. To ascertain the relative full values of gasoline and denaturized alcohol, no less than 3,700 tests have been made, which show that they are of equal efficiency notwithstanding the fact that the fuel value of alcohol is only 6/10ths that of gasoline. These wonderful results have been obtained by subjecting alcohol to a pressure of 180 pounds.

Officers for the ensuing year were elected as follows: Chas. B. Dudley, president; Robert W. Lesley, vice president; Edgar Marburg, secretary and treasurer; Jas. Christie, member of the executive committee.

President Dudley's Address.

President Chas. B. Dudley's presidential address was entitled "Some Features of the Present Rail Situation." It was an exceedingly comprehensive and valuable discussion of the rail problem. The address will be published in full in a later issue of THE IRON TRADE REVIEW. In concluding, Dr. Dudley summarized his views, in part, as follows:

"(1) The crying need of the hour is positive, definite information. Upon dozens of points, no positive data exists.

"(2) The time seems opportune for genuine progress to be made. The railroads through their organization, which, in a sense, speaks for them all, the American Railway Association, have taken up the matter with vigor; they developed a large amount of valuable information, and for the first time in 25 years the steel rail manufacturers have shown a less antagonistic and more conciliatory and co-operative spirit.

"(3) The specifications proposed by the Pennsylvania railroad system and by the American Railway Association seem to represent genuine progress and to be worthy of most careful study and trial.

"(4) Whether the Bessemer process can be so modified and improved as to enable it to furnish rails that will be entirely satisfactory under the heavier wheel loads and denser traffic of today, and the near future, or whether the basic open-hearth will soon be the source from which steel for these rails will be furnished, are questions worthy of serious attention. Our own feeling is that if a small fraction of the time and money that has been spent in the past over the commercial development of the Bessemer process shall, in the next few years, be spent in getting sound ingots, free from blow holes, slag and manganese sulphide, if this shall be found to be as serious as it now looks, and in overcoming or minimizing segregation, it will last for many years to come.

"(5) The American Society for Testing Materials has a most important duty to perform at this juncture. By stimulating the development of information, by furnishing an arena for the presentation of such papers on the metallurgy of steel as are on its program for this meeting, by arousing interest in testing machines and methods of testing, by furnishing a forum where producer and consumer can meet on common ground and discuss their differences unhampered by commercial considerations or by artificial distinctions of professional ethics, and by keeping their own specifications up to date and utilizing new information as fast as it is obtained, it can so fill the field which it occupies, that when the ultimate record is made up, its contribution will be by no means among the least."

Hematite Iron Ore Duty.—In a suit of Francklyn & Ferguson versus the United States, the United States court of appeals, third circuit, held recently that hematite iron ore is dutiable at 40 cents per ton and not at 30 per cent, and sustains the importers' claim.

The number of idle freight cars had decreased June 10 to 349,994; a decrease of 31,910 cars since May 27.

WELCOMED TO DETROIT.

Meeting of the American Society of Mechanical Engineers Opens.

(Special Telegram.)

Detroit, June 23.—The regular spring meeting of the American Society of Mechanical Engineers opened at the Hotel Cadillac this evening, with a registry of 304, this being the largest number registered the first evening in a great many years.

Mayor Thompson of Detroit delivered the address of welcome. He pointed out that the present is the day when the engineer infinitely more than any other class of men control the affairs of business and the affairs of the country and its manifest interests. Originally, he said, the soldiers, statesmen and the business men had controlled its destiny, but the great developments that are making the United States and the world at large a better place to live in were the results of the work of the engineer, who had brought the luxuries of life within reach of the poor man, and on every side and in every way the human race was being greatly benefited.

President Holman of the society responded, thanking him for his cordial welcome, expressing the pleasure it gave the society and its members to hold their meeting in Detroit, where it had held a summer session, and he commented on the beauties of the city, its progressiveness and its desirability as a place of residence.

The regular session of the society will begin on Wednesday morning with a symposium on "Hoisting and Conveying," five papers being presented. Discussion will continue in the afternoon session and in addition papers on "Superheated Steam," "Journal Friction," and "Method of Checking Conical Pistons for Stress," will be read and discussed.

Eight conventions are meeting in Detroit this week, four of them being of particular interest to the engineers, namely, American Society of Mechanical Engineers, Society for the Promotion of Engineering Education, Association of Gas Engine Manufacturers, and the Society of Automobile Engineers.

Thursday morning the members of the society will take a steamer trip to the Great Lakes Engineering Co.'s plant and witness the launching of the 10,500-ton steamer D. B. Meacham. On the return the party will be given an opportunity to see the sinking into place of the fourth section of the Detroit river tunnel. This section is 262 feet long, 64 feet wide and 31 feet deep. There will be a reception that evening at the Cadillac. Friday afternoon, business of the meeting ended, the visitors will be taken on the Britannia up into the lake, thence to Bois Blanc for supper. The local committee having the entertainment in charge is composed of Alex Dow, chairman, W. J. Keep, W. S. Russell, F. E. Kirby, C. G. Herbert, T. H. Hinchman Jr., H. E. Coffin, A. C. Pessano and S. G. Barnes.

SOUTHERN ORE DEVELOPMENT.

Financial plans are being laid for bringing the brown iron ore of Sevier county, Tennessee, into the market. Details are being worked out for the construction of a proposed Knoxville & Sevierville railroad which will be about 26 miles long and will penetrate the heart of the Sevier county iron ore field.

The Woodward Iron Co. has commenced work on a new brown iron ore mine at Woodstock, Ala., where the company's ore fields are located. Two miles of new track are being constructed by the Alabama Great Southern railroad to the proposed slope and the necessary machinery which has been purchased will be installed in due course.

Shelby Tube Plant Burned.—The Shelby works of the Shelby Steel Tube Co., at Shelby, O., a subsidiary of the National Tube Co., were completely destroyed by fire June 18, entailing a loss estimated at approximately $500,000. The plant was idle at the time of the disaster, but it had been in operation on two different occasions since the first of the present year. Its destruction will not interfere in any way with the manufacture of seamless tubes, as the company has just finished and put in operation a large new works at Ellwood City, Pa. No official statement as to the re-building or removal of the works has yet been given out, but it is declared that no decision in this matter has yet been reached, pending the adjustment of the insurance. The Shelby works were built in 1890 and first put in operation in July, 1891. They contained five heating furnaces and eight hc mills, and had an annual capacity or 14,000 tons of seamless tubes. Practically all the equipment was destroyed or ruined by the fire.

The name of the Civil Engineers' Club, Cleveland, has been changed to the Cleveland Engineering Society.

BRIGHTER CONDITIONS

Among Indianapolis Industries More Prevalent Than Since October.

Indianapolis, Ind., June 22.—The local industrial situation is much brighter than it has been at any time since last October. This is especially true of the iron manufacturing plants, most of which are now running under about normal conditions. Building operations requiring large quantities of structural iron are heavier than they have been for many years. In Indianapolis alone the amount of building permits issued last month was about 40 per cent greater than in May, 1907. Several other big buildings are contemplated yet this year and conditions are about the same out through the state.

The plant of the S. G. Taylor Chain Co., Maxwell, has been closed and there is some uncertainty as to when it will be reopened.

The Hetherington & Berner Iron Works here has closed a contract with the city of San Francisco for a municipal asphalt paving plant for that city. It will have a capacity of 500 yards a day and will be erected at once. The same company has just completed a municipal asphalt repair plant for this city.

STRUCTURAL CONTRACTS AWARDED.

New York, June 23.—Although structural lettings in this district during the past week have been few and of relatively small tonnage, there is evidence that slightly higher prices for fabricated work are now being demanded. In the face of the recent cut in structurals, this is explained by the fact that those concerns which have made the lowest prices have taken on considerable tonnages and are now less eager for business. A 700-ton apartment house in this city has been taken by the Cambria Steel Co., a 700-ton loft building by J. B. & J. M. Cornell, a 100-ton bridge job on the Lehigh Valley by the American Bridge Co., and 500 tons of the 700-ton New York Central job at Rochester by the Toledo & Massillon Bridge Co. The Pennsylvania Steel Co. has sold 500 tons of rails to the Boston Elevated and the receiver of a local line is inquiring for 800 tons. An inquiry for about 1,400 tons of light rails for export is also pending.

The publication in the daily press to the effect that the Youngstown Sheet & Tube Co. has received large orders for shipment to the coast is officially denied by the company. Denial is also made that other large orders have been received.

PERSONALS.

C. A. Sattley, general manager, E. B. Hoagland and W. A. Paul have resigned their positions with the Peru Plow & Wheel Co., Peru, Ind.

L. Bialosky has withdrawn from Bialosky Bros. & Co., scrap iron and steel, Cleveland, and the business will be carried on as heretofore by J., S. J., and I. Bialosky.

Walter A. Hirsch has been appointed receiver for the O. S. W. Corporation, 15 Broad street, New York, which was organized to promote patents for a new steel wire for packing purposes.

James A. Church, for many years assistant superintendent of the former Edward P. Allis Co. of Milwaukee, and the first manager of the Milwaukee School of Trades, has left Milwaukee accompanied by his wife and daughter for a two years' trip abroad.

J. Tatnall Lea, of Philadelphia, has been elected a vice president of the Lake Superior Corporation, and F. W. Ayer, president of the Merchants' National Bank of New York, has been made a director. Francis B. Reeves recently resigned from the directory board.

B. A. Wallingford, vice president of the United Iron & Steel Co., Pittsburg, will leave this week for a tour of inspection of the company's ore properties on the Mesabi ranges. Mr. Wallingford will be joined in the mining regions by other members of his company and will continue the trip in this party.

C. S. Redfield, advertising manager for the Yale & Towne Mfg. Co., has left with his family for a three months' trip to Europe to return Aug. 1. Mr. Redfield was recently elected president of the Technical Publicity Association which embraces in its membership the advertising managers of most of the large electrical, machinery and other plants in the United States.

George Greer, of New Castle, Pa., has retired as district superintendent of the American Sheet & Tin Plate Co., in charge of the mills at Sharon, Pa., and New Castle, Pa., to devote his energies to personal business interests, including a large cement plant in Lawrence county, Pa. His brother, Chas. Greer, assistant district manager of the American Sheet & Tin Plate Co., who retired two months ago, is also giving his attention to this investment. With Mr. Greer's retirement the office of district manager has been abolished, and David J. Pyle, who has been assistant to Mr. Greer, has been made superintendent of the Shenango mill at New Castle. Bert J. Ross, who has been superintendent of the South Sharon tin mills, has been made superintendent of the Greer mill at New Castle, and W. V. Davis of Cleveland has been made superintendent of the South Sharon mills. Mr. Greer was a pioneer of the tin plate industry, and he has been connected with many of the principal steps in its progress.

OBITUARY.

Jonathan S. Hazelton, president of the Rome Brass & Copper Co., Rome, N. Y., died June 15, aged 61 years.

A. R. Monroe, leading shareholder and manager of the Monroe Wire Works, New Glasgow, N. S., died June 11 from a stroke of apoplexy, aged 44 years.

John B. Viets, western representative of the Dodge-Davis Mfg. Co., died June 19 at his home in Chicago, aged 55 years.

E. H. Myers, prominent in Pittsburg's business world, died in that city June 21, aged 84 years. Mr. Myers was a director of the Parkersburg Iron & Steel Co. and was interested in numerous other enterprises.

John D. Speer, a well known young business man of Pittsburg, died June 17 after a brief illness with grip and pneumonia. Mr. Speer was 36 years of age and for some time had been connected with the Pittsburg Valve, Foundry & Construction Co.

Peter H. Jackson, one of the founders of the James L. Jackson Iron Works, a pioneer structural iron and steel concern in New York City, died June 17 at his home in Oakland, Cal., aged 79 years. He came of a family which had been connected with the iron working trade in New York since 1745. The company which he helped found supplied the iron work for a number of early office buildings in the city, but went out of existence about two years ago. Francis D. Jackson, vice president of the Hecla Iron Works, Brooklyn, is a son.

A fire which started in the pattern and storage building June 20 threatened the Lodge & Shipley Machine Tool Co.'s plant at Cincinnati. The loss on patterns and building will probably reach $15,000.

The Struthers, O., stack of the Struthers Furnace Co., which was blown out June 1, following a breakout, will be blown in again the latter part of the week, repairs having been completed.

REPUBLIC IRON & STEEL CO. IMPROVEMENTS.

Important additions and changes are to be made at the Youngstown steel works of the Republic Iron & Steel Co., which will close down Saturday for that purpose and will probably be out of operation for two or three weeks. In the sheet bar and rail mills, two new stands of rolls will be installed, with the idea of securing increased capacity and rolling longer lengths. New tables are also to be put in place and shears will be used hereafter to cut the bars, which heretofore have been sawed. These changes represent an outlay of about $200,000 and in addition to increasing the plant's output and improving the quality of product, are expected to reduce the production cost materially. The Republic company is also opening up new mines, installing minor improvements at other plants and giving its properties generally a thorough overhauling.

Announcement was made a week ago that the company's improvement program would be carried through, although this meant the suspension of payment of the quarterly dividend of 1¾ per cent, which had been considerably more than earned during the depression period. In this connection the following statement was made by John A. Topping, chairman:

Under the provision of the general mortgage the balance of net quick assets of the company must be maintained at not less than $6,500,000, and with the balance of net quick assets as of May 31 at $6,717,563.84 it was the opinion of the directors that the required net balance of quick assets could not be maintained if further dividend disbursements were made at this time. Dividends could have been paid if expenditures on account of improvements and reconstruction were stopped, but this was not deemed advisable by the directors.

The amount expended during the year to date on account of new construction has been $851,710.11, and in addition to this sum the amount expended on account of reconstruction and general maintenance for the year to date aggregates $997,623.66. The net surplus profits for 11 months ended May 31, 1908, after deducting all dividend disbursements made during the current year, is $1,119,974.58, and with current net profits on a basis equal to the preferred dividend requirements.

Dedicate New Club.—The Manufacturers' Club, Philadelphia, formally took possession of its new quarters June 16 in the old Bellevue, at Broad and Walnut streets. Despite a downpour of rain President Nathan T. Folwell with others mounted the roof and raised to the top of the flag pole a fine new American flag. Open house was maintained for the remainder of the week for members, their wives and guests.

TRUST RUMORS

FROM ENGLAND HAVE LITTLE FOUNDATION.

Price Reductions in America Have Depressing Effect Across the Ocean---Rail Sale Not Confirmed.

Office of THE IRON TRADE REVIEW,
Prince's Chambers, Corporation St.,
Birmingham, Eng., June 13.

The condition of the iron trade continues disappointing. Now and again there is an outbreak of optimism, generally followed by further reductions in prices. In the Midland market, of which Birmingham is the center, "nibbling" is constant, and some firms must now be selling below cost price. Unmarked bars have been sold at from £6-2-6d to £6-5. The recognized standards have long since been abandoned as hopeless. Pressure is now concentrating itself upon marked bars, which stand at £8-10, or more than £2 above the unmarked article, and buyers are clamoring for reductions. It seems tolerably certain these will have to be cut down before quarter day which is due on July 9. All the finished branches are very dull, and purchases are restricted rigidly to urgent and immediate wants, nobody buying forward. There has been a good deal of talk here about a contract for 1,000,000 tons of steel rails, which the United States Steel Corporation has obtained for Russian requirements. This still awaits confirmation, but the material point for this country is that so far the orders for British houses have not increased to the slightest extent. In Sheffield, this week, rolling mills, crucible steel furnaces, cutlery and plate shops have been idle all the week for the Whitsuntide holidays, and hardly any work has been done in the South Staffordshire district.

Effect of American Reduction.

There is a slight improvement in the rolling stock industry due to the placing of some substantial Indian and South American contracts with the big firms here. Much reliance is placed on certain recommendations just made by the select committee on Indian railway administration to the effect that £100,000,000 sterling should be spent upon the railways of the eastern dependency during the next eight years. In the steel trade the reports of the "cut" in American steel have caused some depression, and the immediate effect seems to be a reduction of 5 shillings a ton just declared in Scotland bars and angles, bringing the minimum selling quotation to £6 17s 6d for boiler plates, and £5 15s for angles, all subject to 5 per cent discount. So far it would seem that very little foreign steel is coming in, and generally speaking British makers are adopting a most determined attitude in cutting down prices with the object of meeting the severest competition coming from abroad. The weak point in all this class of trade is the poor demand for ship building, this department being almost stagnant.

Trust Rumors.

The air has been full of rumors during the past few days of a gigantic steel trust on international lines. One journal, *The Iron & Steel Trades Journal*, went so far as to say that the combine had been successfully formed, covering the huge capital of £125,000,000, was likely to include all makers of steel plates and angles, and would cover not only this country, but Germany, Russia and the United States. The most careful enquiries have been made in all the steel making districts, and the statement can certainly be dismissed at the present stage as "previous," if not absolutely unfounded. The Scotch steelmakers, who constitute a most important section, categorically deny any association or knowledge of the scheme. Other large concerns which habitually refuse information with regard to their doings, prefer non-committal replies. The most that can be said at present is that such a combination is not impossible, for the reason that all the steel-making concerns are on a large scale, have carried scientific production to a high degree of efficiency, and, to an extent, have interests in common. But apparently the too-confident author of the story has attached exaggerated importance to an effort undoubtedly being made to include certain outstanding concerns in the existing agreement by which home prices are already regulated with a view of minimizing competition. There are only a few firms outside this, but they happen to be very important, and aloofness is a continual thorn in the side of the combined firms.

Pig Iron Market.

Reports in regard to pig iron are a little inconsistent this week. In the midland district there is great weakness, stocking being more general than since the slump commenced. Northampton has been sold at the phenomenally low price of 44s ($10.76). Yet in this district there is more enquiry, consumers having apparently run their stocks down to the lowest ebb. Consequently, there have been some sales. The Middlesbrough market maintains a fair degree of strength, rather difficult to account for, in view of the comparative stagnation of the finished trade in the north of England, and especially the dullness of everything connected with ship building. Stocks continue to decrease, and the price reported yesterday was 51s 6d ($12.60), compared with 50s 9d ($12.42), a week ago for No. 3. The price of warrants shows an increase of about 9d. The continual decrease in stocks is a most important circumstance. This seems to be due rather to a reduction of output than improved demand, but it is a fact that buyers in that district have been at last driven on to the market by sheer necessity. There has been a little improvement in hematite, following on the settlement of ship building troubles, the east coast quotation being, for mixed numbers, 57s ($13.94), with rather more business done. In all directions there are reports of furnaces being blown out.

STATISTICAL BUREAU FOR PIG IRON INTERESTS.

Joseph G. Butler Jr., of Youngstown, in a letter to the *Manufacturers' Record* says:

"There is under consideration at the present time a statistical bureau for the entire pig iron interests of the United States. I am quite sure that if the southern producers will join heartily in this movement it will be very much to their advantage, as well as to the advantage of their brother producers in the east and north. The committee who had the matter of forming this bureau of statistics in hand decided that to start it in a practical way the manufacturers should be asked to report to a commissioner—

"First. In the first report to give the stock on hand in tons by grades, and subsequently—

"Second. To report the weekly make in tons by grades.

"Third. The weekly shipments in tons by grades.

"Fourth. The weekly sales in tons by grades.

"That the commissioner be instructed to tabulate the information received and to give the recapitulation each week only to those furnishing reports, and that a uniform blank be prepared and sent each member of the bureau, and that weekly reports be made at the close of business as of 6 o'clock P. M. each Saturday."

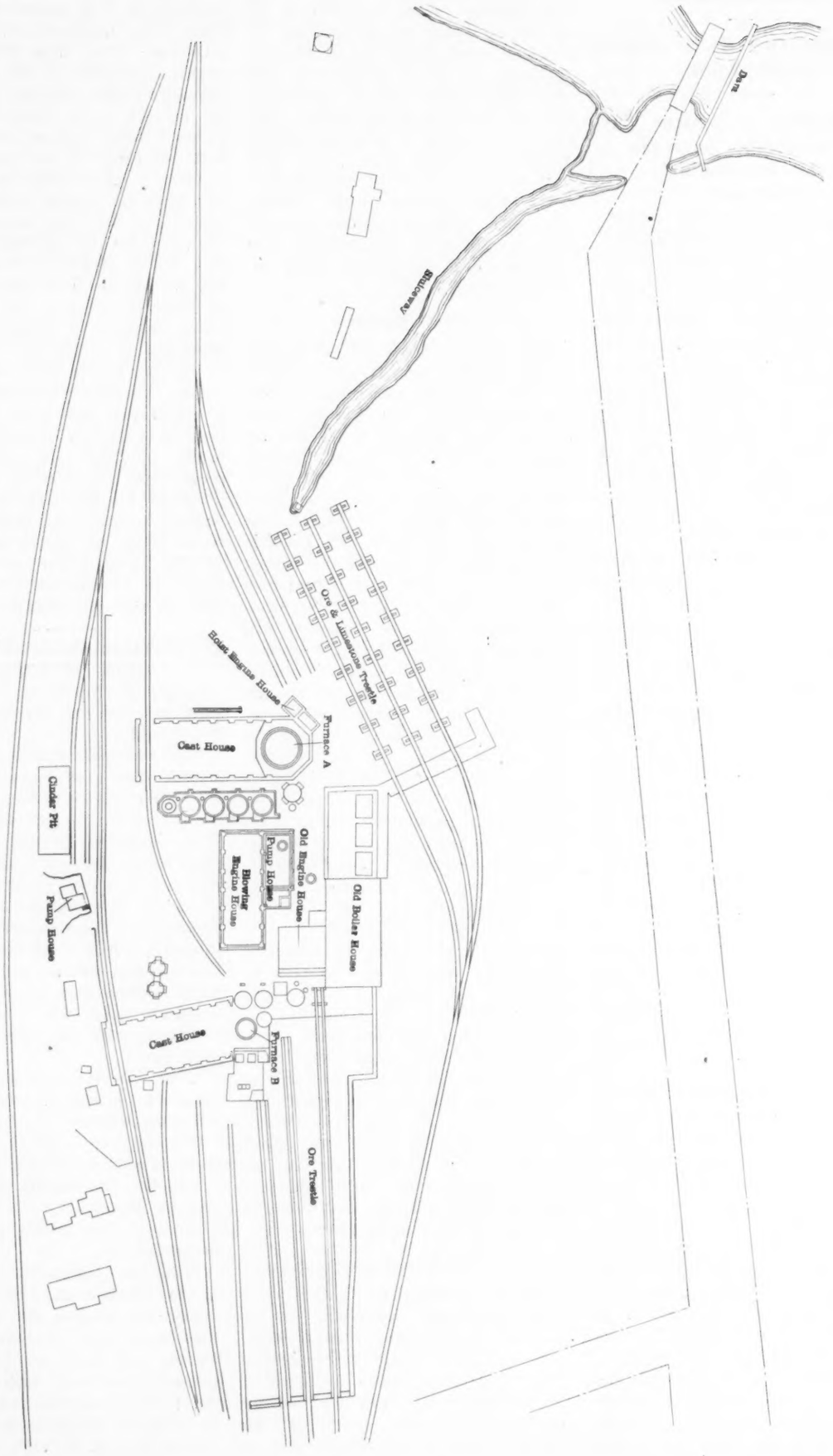


FIG. 1—PLAN OF FURNACE PROPERTY, NORTHWESTERN IRON CO.

THE FURNACE PLANT OF THE NORTHWESTERN IRON CO., MAYVILLE, WIS.

The Northwestern Iron Co. has, by reason of the natural advantages it possesses, an unusual opportunity for making pig iron at low cost. It acquired cheaply and now owns land at Mayville, Wis., ample for a large and well arranged plant; it owns and controls water rights on the adjacent river sufficient for all of its needs; it owns ore mines located within five miles of the furnace; its properties also carry limestone, part of which is used in its furnaces and there is sufficient of stone for the remainder of its requirements obtainable within a radius of 10 miles. It has an interest, through its connections, in the Newport and Anvil mines of the Gogebic range, giving to this plant the shortest all-rail ore haul from the Lake Superior mines of any coke stack. This is with the exception of the Zenith furnace at Duluth, which does not enjoy, however, as favorable a freight rate. In addition to these advantages, upon the side of conveniently located raw materials, the plant is adjacent to one of the largest pig iron consuming cities in the country.

Long ago the opportunities of this location were apparent and in 1848 the original Mayville furnace was constructed to make charcoal iron by Messrs. Niles & Orr, who had been operating a small blast furnace in Indiana. The adjacent ore bodies were opened at the same time, but the quantity mined was small, inasmuch as the capacity of the furnace in its early years was only about seven tons daily. Last year, 20,000 tons were mined. In this district, the ore is overlaid by limestone with which it is more or less intermingled and as a result the ore is partially self-fluxing and in the beginning was used almost entirely without additional flux. It was also necessary at that time to haul the pig iron by team from the stack to the little town of Oconomowoc, whence it was shipped by rail to Milwaukee.

The Northwestern Iron Co. was organized in February, 1854, by J. L. Bean, who acted as its first president. Through various changes in the management, the Bean family retained its interest until the summer of 1867, when Capt. I. M. Bean, son of the first president, was placed in charge, and continued in control up to this year. Frequent alterations have been made during these years, the last being the erection of a new stack known as furnace B, the rebuilding of the old furnace A, the erection of two new cast houses, the building of a new power house, the addition of steel ore unloading trestles and a general enlargement of the plant. In January, 1908, Ferdinand Schlesinger, well known in connection with the

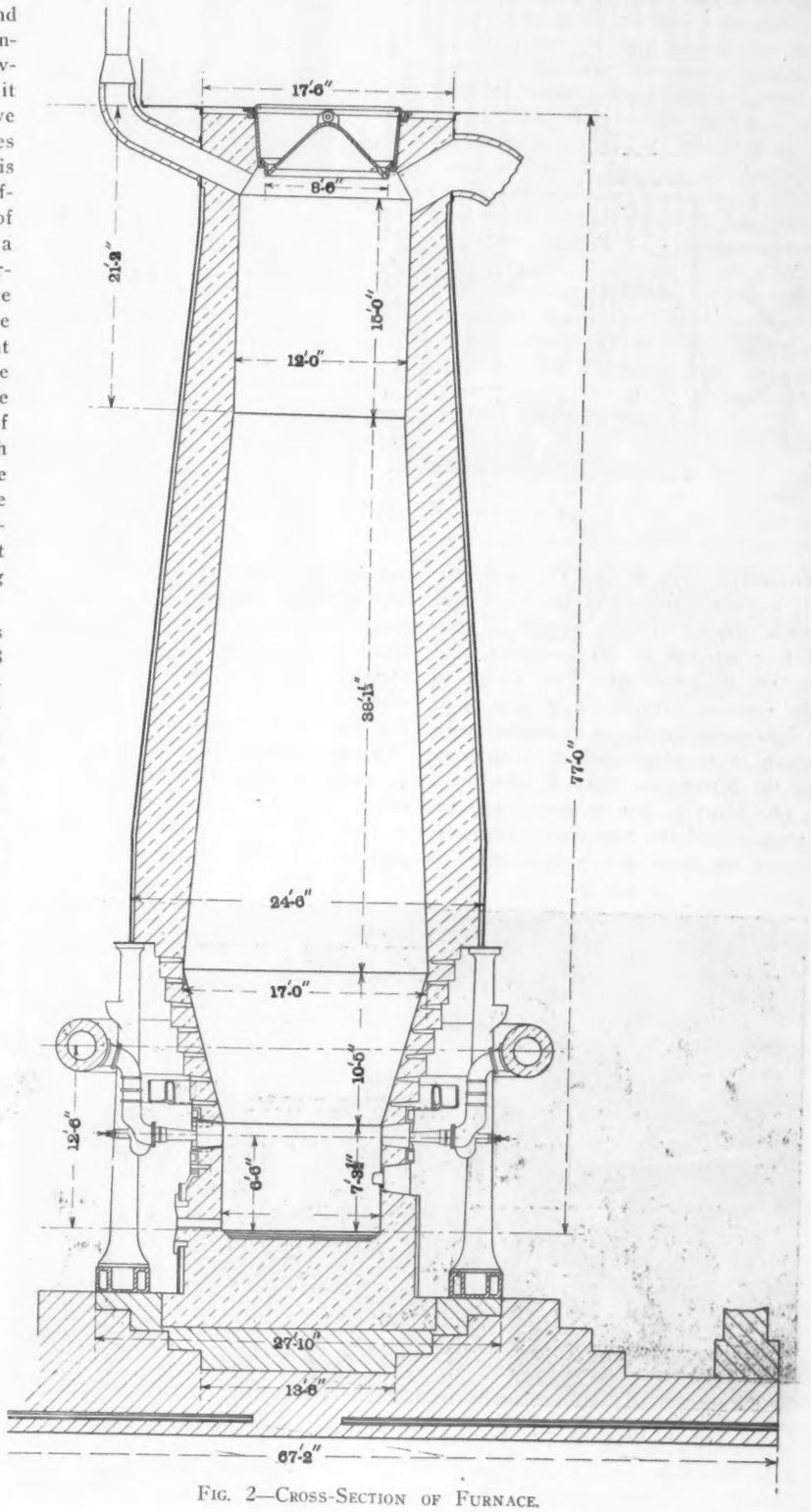


FIG. 2—CROSS-SECTION OF FURNACE.

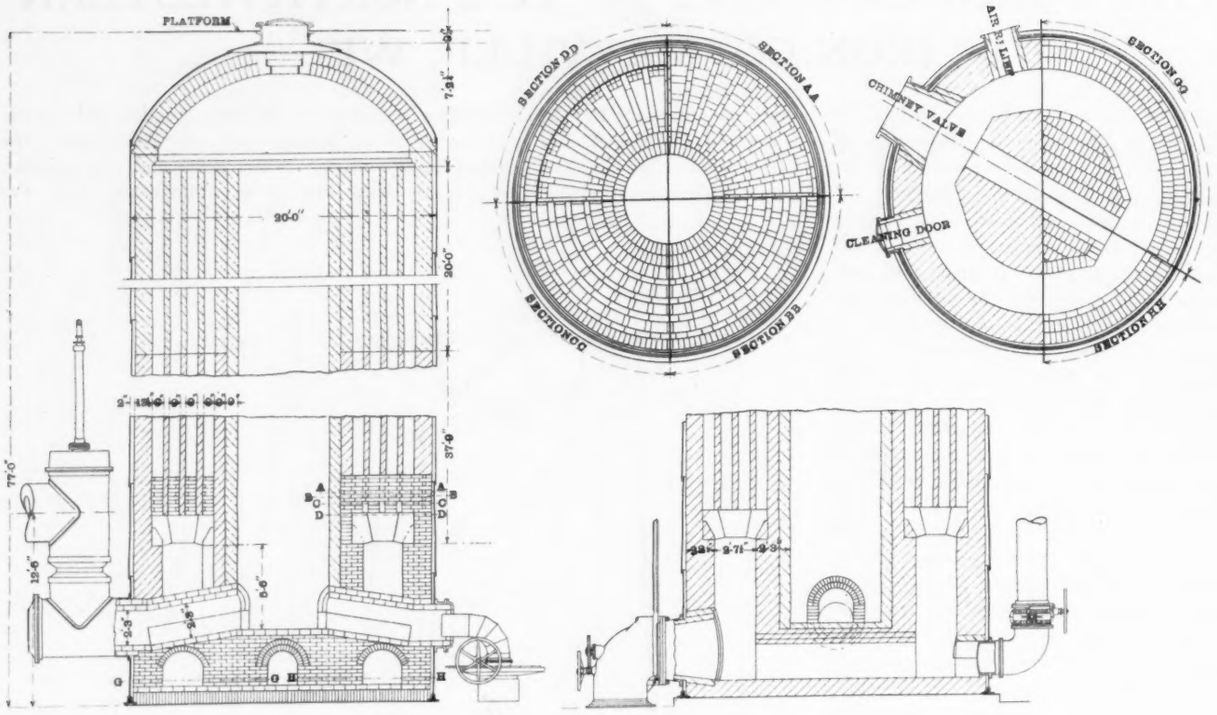


FIG. 3—CROSS-SECTIONS AND PLANS OF STOVES.

Milwaukee Coke & Gas Co., and also his various interests in the Lake Superior mining district, bought a controling interest in the company, and became its president. This added to the existing advantages of this plant a convenient supply of by-product coke which is manufactured at Milwaukee by the Milwaukee Coke & Gas Co.

The plant as it now stands was rearranged and the new construction designed by Julian Kennedy, furnace B and its accompanying stoves being of the Kennedy design. The improvements are not yet complete and a new stove is about to be added to the present equipment of furnace "A," which has three Cowper-Foote stoves that have been in service for a number of years. Following this it is the plan to install a complete new battery of stoves for "A" stack, building one at a time to avoid shutting down the furnace. Arthur G. McKee, Cleveland, is constructing the present new stove. A new electric generating plant for lighting is to be built also, which will not only serve the furnace plant but will supply the town of Mayville. The present plant stacks have capacities of 250 and 300 tons per day, respectively.

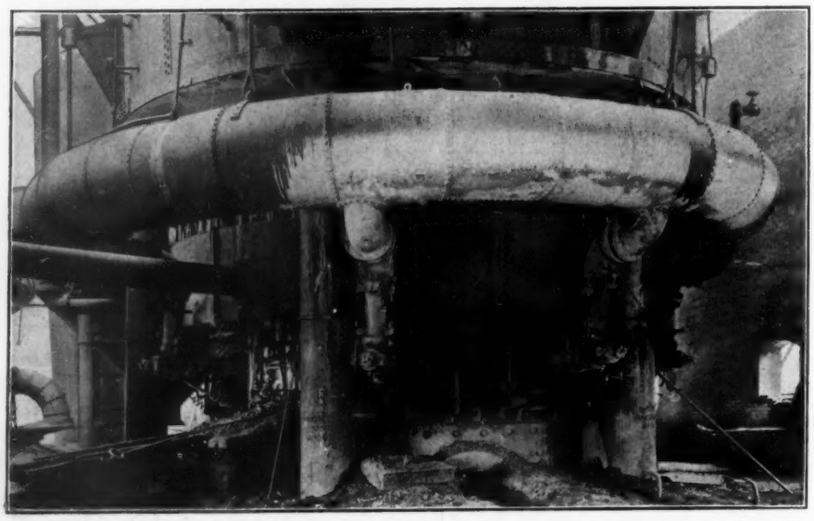


FIG. 4—VIEW OF THE BOSH OF "B" STACKS, NORTHWESTERN IRON CO.

The general layout of the Northwestern Iron Co. plant is shown in Fig. 1. The general arrangement provides for bringing in the ore, coke and limestone at the eastern end of the property and shipping the pig iron from the opposite end. The source of water is shown and the relative locations of the stacks and their respective storing trestles. Furnace "B" was completed and blown in, in May of last year but "A" stack was also remodeled so that both stacks are of very similar construction. Cross sections of "B" stack and the new 77 x 20 foot stoves are shown in Figs. 2 and 3. The stack is in size 17 x 77 feet and of standard construction. The difference in the two stacks, most apparent, is that "B" stack has eight supporting columns and eight tuyeres while the older stack has the same number of tuyeres and only six columns. The bosh of one of the stacks is shown in Fig. 4 and general view of the stacks and cast houses is

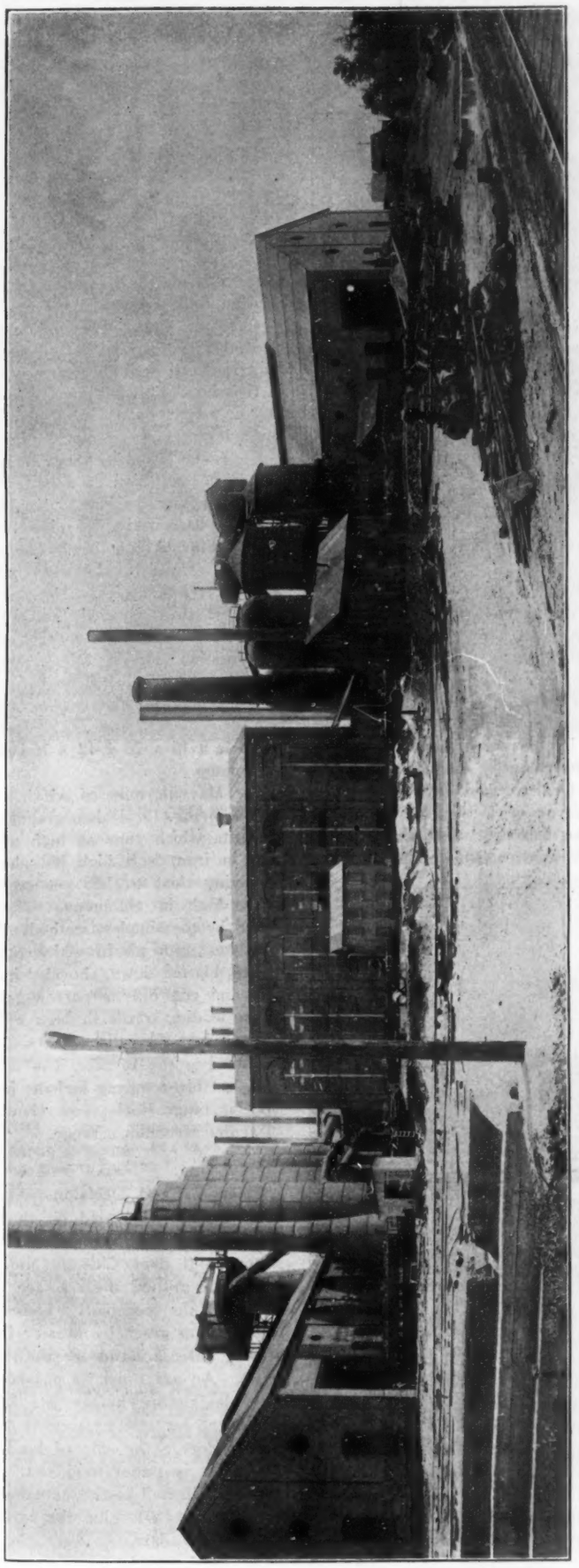


FIG. 5—GENERAL VIEW OF NORTHWESTERN IRON CO., FURNACES, STOVES AND CAST HOUSES.

shown in Fig. 5. These furnaces in the past have run on various grades of iron and the frequency with which the run is changed has lead to a preference for hand filling. For corollary reasons it has not seemed necessary to install ore, coke and stone bins, and as indicated in Fig. 1 these materials are unloaded through trestles adjacent to the stacks. The old trestles at the right end of the plant and where the materials for furnace "A" are stored, are three parallel wooden structures of somewhat smaller capacity than the new ones of steel. The new trestles shown in the different views in Figs. 6 and 7 are of steel and are 32 feet high, 416 feet long, with bents placed 32 feet apart. From the stock piles underneath the trestles, the raw materials are shoveled by hand into buggies which are rolled over to Otis elevators alongside of each stack, carried to the charging platforms of the stacks and charged by hand. There are two elevators for each stack, operated in balance by means of standard Otis elevator hoists.

New cast houses, 40 x 120 feet, were built for both stacks. They are of brick and steel construction and the interior is shown in Fig. 8. The iron is cast in the usual beds in the sand floor and the railroad shipping tracks run through the end of the building opposite the stack. The casting floor is elevated sufficiently above the track grade so that the iron may be run directly into box cars by means of trucks and movable narrow-gage tracks laid on the bed of the cast house. The building is constructed with pilasters designed for the future installation of an overhead crane, which will eventually supplant the surface method of carrying the iron. The windows in the cast house are hung with vertical sliding steel doors and the sprinkler system for cooling the iron consists of perforated pipes hung horizontally from the roof trusses and capable of being rotated in a semi-circle so that streams of water are sprayed over the entire floor of the cast house. The rotating of these water pipes is by means of a chain and hand wheel from the floor.

All of the slag is granulated and is carried away by the railroad gratis, to be used as ballast. The arrangement for granulating consists of discharging the slag from the slag runner through a specially constructed nozzle, a view of which is shown in Fig. 9. This nozzle has apertures so arranged that the bosh water squirts into the running slag as it falls into the flume, granulating it and washing it down through this cast iron flume to the concrete lined cinder pit, the location of which is shown in Fig. 1. This pit is 85 feet long, 25 feet wide and 15 feet deep. On a track alongside is a "Brownhoist" crane with a perforated

clam-shell bucket by means of which granulated slag is lifted out of the pit into railroad cars which can be run in on a parallel track. The cars for loading pig iron are those in which the coke is shipped into the plant which facilitates the handling of cars.

FIG. 6—VIEW OF THE STEEL UNLOADING TRESTLES AND "B" STACK.

The new blowing engine plant is a splendid installation of vertical Allis-Chalmers engines of the long crosshead type. There are five units, three having high pressure steam cylinders and two low pressure, these latter being placed one on either end, with the air piping so arranged that any one of the high pressure units may be coupled to one of the low pressure to run compound, leaving one high pressure unit free to be substituted in case of emergency. The high pressure cylinders are 44 x 60 inches, the low pressure 84 x 60 inches, and the air cylinders 84 x 60. The engines run from 30 to 35 revolutions per minute and furnish about 1,500 cubic feet per minute per cylinder.

The engines are run condensing and the steam ends are equipped with regular Allis-Chalmers valves, the air ends with Corliss rigged poppet valves. There is an individual air pipe connection from each cylinder to the main header, each air main being furnished with a slow opening gate valve. A convenience has been added to the handling of these valves by setting the hand wheel at right angles to the valve stem, operating by means of miter gears. This brings the hand wheel parallel to the engine gallery and into the most accessible position. The engine room is spanned by a Pawling & Harnischfeger 20-ton crane, and the new type of Uehling revolution recorder has been installed on these engines. This instrument registers the revolutions at the present instant and makes a continuous dial record of the speed throughout the day.

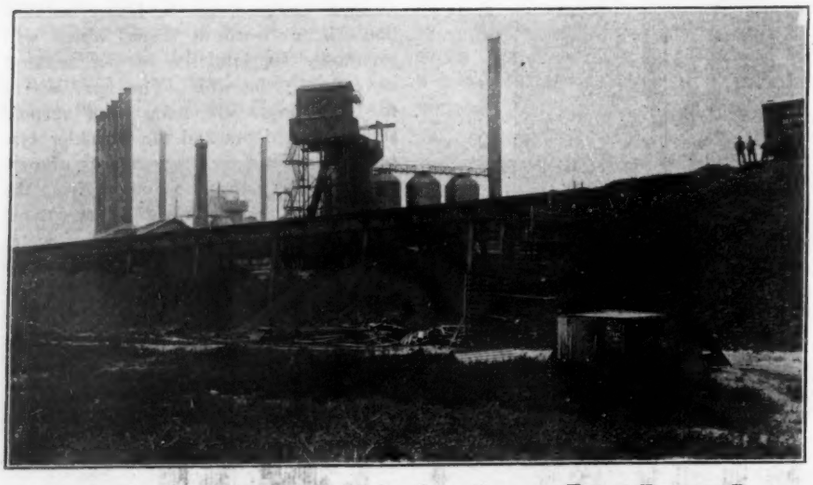


FIG. 1—VIEW OF STEEL ORE TRESTLES, COKE PILE AND TOP OF FURNACE B, NORTHWESTERN IRON CO.

The engine house is a brick structure 50 feet wide and 156 feet long and contains nothing but the blowing engines. The pump house is a brick lean-to 30 feet wide and 60 feet long on one side of this building and the pumping equipment consists of service water and condenser pumps. The former pumps consist of two duplicate units to be used alternately and having a capacity of 5,000,000 gallons per day, each. They are DeLaval twin-turbine sets operating under a steam pressure of 110 pounds and at a speed of 1,450 revolutions per minute connected to centrifugal pumps having a lifting capacity of 72 feet. The water is delivered at a pressure of 22 pounds per square inch. The condensing water is handled by means of a Lawrence upright engine direct connected to a centrifugal pump. The condenser which is of the jet type and its tail pump were built by Prescott. The water is dammed in the river so that it runs in by gravity to the well under the pump house, through the sluice shown in Fig. 1.

The boiler plant has been increased in size by the addition of a battery of six 345-horsepower Stirling boilers, the former plant consisting of nine 150-horsepower Milwaukee boilers. The old battery is arranged in triplicate sets and the new battery in pairs. The excess gas from the stack is used for fuel almost exclusively in all the boilers and there remains in addition fully 1,000 horsepower, part of which is to be utilized to supply power for the new electric lighting plant to be built. The boiler feed pump is a 16 x 26 x 12 x 16-inch Burnham pump.

The Mayville mine of which a view is shown in Fig. 10 yields a granular brown hematite which runs as high as 48 per cent in iron, is a high phosphorus ore averaging close to 1.25 per cent and is fairly high in aluminum. The ore is mined by the simplest methods, the mine being an open pit in which the ore is drilled, blasted down, shoveled into small cars and run over a narrow-gage track to the loading trestle through which it is dumped into the railroad cars for transportation to the furnace. The other ores used by this company include, beside its Gogebic range stock, some Hemlock ore from the Menominee range.

Chicago Land Decision.—About 100 acres of land occupied by the Illinois Steel Co. along the Lake Michigan water front near Chicago, and valued at half a million dollars, are illegally held by the company, according to the decision given by Master in Chancery J. M. Holland of the Superior court. An act must be passed by the state legislature before the land can be offered for sale, as a court of equity cannot decree the sale of land by the state. It is understood that all that can be collected is the actual value of the land in 1891, plus the interest on that sum to date.

FIG. 8—INTERIOR OF CAST HOUSE.

FORMULAE FOR CHAINS.[1]

BY J. H. BAKER.

All manufacturers give tables on chain, and Trail gives a most complete collection of tables. The author has deduced some formulae that have been found useful. From the nature of the case figures as to the strength of chain can only be given approximately.

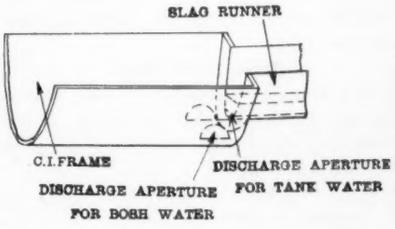


FIG. 9—SLAG RUNNER AND WATER SUPPLY FOR GRANULATING.

Dimensions of Links.

Stud Chain.—Maximum length, inside, four diameters of the bar from which it is made. Maximum width, inside, 60 per cent of inside maximum length.

Standard Close Link. — Maximum length, inside, three diameters of the bar from which it is made. Maximum width, inside, 70 per cent of maximum length inside.

Coil Chain.—This generally runs about like close link, but if anything somewhat longer in the links.

Crane Chain.—Length, inside, 2⅝ times the diameter of the bar from which it is made, but it varies a good deal. However, as a rule the shorter the link the

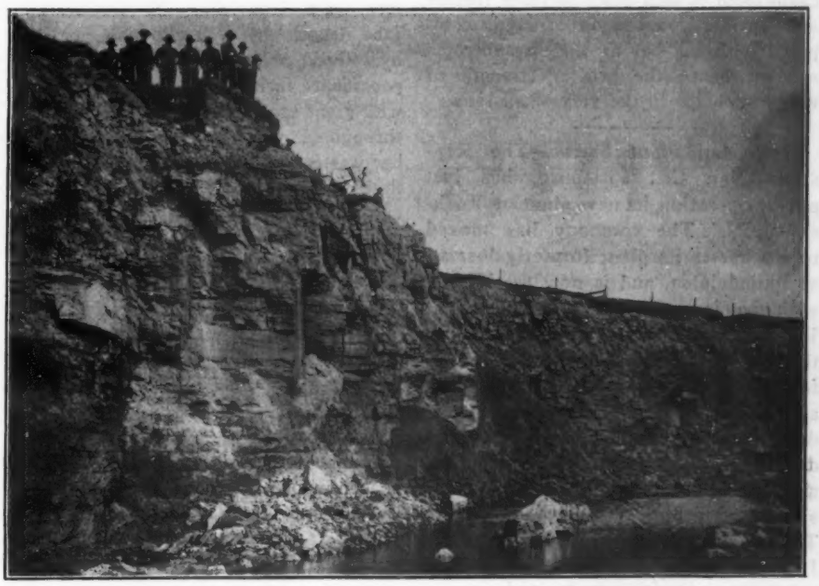


FIG. 10—A VIEW OF THE MAYVILLE ORE MINE, SHOWING THE FORMATION AND THE MANNER OF PULLING THE ORE DOWN FROM THE BANKS.

[1]From a paper on "Chains and Chain Making," presented before the Engineers' Society of Western Pennsylvania, and published on page 22 of the May, 1908, Proceedings.

better. Note that allowable variation under maximum dimensions is about 4 per cent, and it should be about 2 per cent below the maximum.

Weights.

Stud Chain.—Three and three-quarter times the weight of the bar from which it is made. This includes the stud, it being equalized by the extra length of link.

Standard Close Link.—Three and three-quarter times the weight of the bar from which it is made.

Coil Chain.—Three and five-eighths times the weight of the bar from which it is made.

Crane Chain.—Four times the weight of the bar from which it is made.

This extra weight is due to the links being somewhat shorter, and to the "crowns" on the welded ends being heavier than on common chain links.

Breaking Strength for Well-Made Chain.

Stud Chain.—165 per cent of the strength of the bar from which it is made.

Standard Close Link.—138 per cent of the strength of the bar from which it is made.

Coil Chain.—120 per cent of the strength of the bar from which it is made.

B. B. Crane Chain.—145 per cent of the strength of the bar from which it is made.

Note that the weight and strength run a little higher on the light sizes up to about 1 inch as the bars from which these are made are 1-32 of an inch larger in diameter than the nominal size of the chain. When in light sizes the chain is made of exact sized bars, the chain size is given as "Neat." Ordinary, or die chain from ¼ inch down becomes further and further lowered in strength compared with the bar as the sizes become smaller, hence the greater strength of weldless chains in the very small sizes.

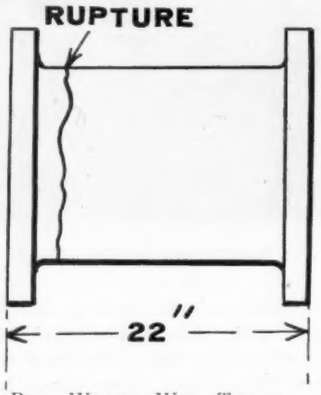
New Nail Plant Starts.—The Keystone Nail Co., Pittsburg, has just put in operation its new plant at Rochester, Pa. The company has moved to Rochester its plant formerly located at Philadelphia, and is now established with an increased capacity of about 150 per cent. The main building of the new plant is of brick, 100 x 300 feet, and there are the usual smaller auxiliary buildings. The company produces galvanized nails, operating under its own patents in connection with the hot dip process and is now in position to produce 1,000 kegs a day. The officers of the company are H. J. Maroney, president; J. D. Seidell, treasurer, and Geo. F. Breisch, secretary. Its offices are in the Keystone building, Pittsburg.

THE BURSTING POINT OF FLANGED PIPE.

In THE IRON TRADE REVIEW of December, 1907, were reprinted from *The Valve World* for November, 1907, the results of a series of tests made to determine as nearly as possible the point of rupture of flanged fittings under hydraulic pressure. In that article it was stated that no attempt was made to determine the strength of cast iron pipe, only one piece having been destroyed, with a result practically the same as for an elbow of the same diameter.

The pressure per square inch which ruptured 12-inch tees with metal 1 inch thick and a tensile strength of 22,000 pounds per square inch as shown by bars cast at the same time, was as follows: Tees, 1,100 pounds; 1.400 pounds; 1,500 pounds; 1,450 pounds; 1,450 pounds; average, 1,380 pounds.

In order further to check this result and ascertain whether a tee was actually weaker than a pipe, Crane Co. has since made a piece of 12-inch cast iron pipe 22 inches long (the length of a tee) with metal 1 inch thick, and burst it at 1,500 pounds per square inch. This casting was made with great care and the thickness of metal throughout was very uniform. A test bar was cast at the same time in the same flask and a second bar afterwards was cut out of the pipe itself. The results as given by the *Valve World* follow:



PIPE WHICH WAS TESTED.

The tensile strength of the test bar cast in the flask with fitting (skin on four sides), was 22,140 pounds per square inch. The tensile strength of the bar cut from the fitting (skin on two sides), was 19,710 pounds per square inch. It will be observed that the bar cut from the fitting was about 10 per cent weaker than the bar cast separately. This will be found true as a general rule.

The piece of pipe was stronger than the average of five tees, but it was not stronger than one of the tees and practically no better than four tees out of five. It may, then, be set down that any rule which applies to fittings will apply equally as well to pipe. In the earlier article it was suggested that a safe rule to determine the bursting point of fittings up to 12-inch diameter, the tensile strength of metal being known, would be: "Thickness divided by diameter and multiplied by 65 per cent of the tensile strength of the metal as shown by test bars." In the present example this would give:

$100 \div 12 \times 0.65\ (22{,}140) = 1{,}199$ pounds,

which is considerably on the safe side; but as one tee burst at 1,100 pounds it cannot be considered too conservative. The rule is intended to provide against core shifts, difference between actual strength and that shown by test bars, and minor foundry imperfections.

The *Valve World* states that it had many letters from correspondents taking exception to a rule which took the diameter instead of the radius as a factor. In one letter it was stated that the rule laid down by Rankine, which may be given as: "Thickness divided by radius, multiplied by tensile strength equals bursting point," could be demonstrated mathematically and was as certain as any law of nature. The *Valve World* admitted the mathematical demonstration and also the applicability of the rule to thin rolled steel cylinders; but it stated that it certainly does not apply to cast iron pipe of any reasonable thickness, because a heavy cylinder is governed by entirely different laws.

Referring again to the piece of pipe under discussion, the actual strength of the metal was 19,710 pounds per square inch. Then, using the diameter as a factor and assuming the cylinder to be perfect, we have:

$1.00 \div 12 \times 19{,}710 = 1{,}642$ pounds, giving us a result about 11 per cent greater than the actual. It is quite evident that if the radius were used the result would be 3,284 pounds, or an error of more than 100 per cent.

Thin Steel Pipe.

The Rankine formula may be applied to thin steel cylinders, as shown by the following destructive test on a piece of 10-inch steel pipe:

Internal diameter of pipe, 10.09 inches.
Thickness of metal, 0.33 inch.
Tensile strength, 52,500 pounds.
Bursting point, 3,000 pounds per square inch.

By rule this bursting point should be:

$0.33 \div 5.045 \times 52{,}500 = 3{,}433$ pounds,

which is about 14 per cent greater than the actual.

The pipe did not rupture in the weld, hence the loss of 14 per cent between the actual and theoretical cannot be accounted for in that manner. All of which leads to the conclusion that liberal factors of safety may be advantageously employed.

The Panama canal commission has accepted the bid of the Elyria Steel & Iron Co., Elyria, O., for 200,000 tie plates, the bid being $11,887.

RECENT DEVELOPMENTS IN CHARGING MACHINES

Three general types of charging machines for open-hearth furnaces are in use at the present time—the overhead type, the high floor type, and the low floor type—the last named being the latest development. We are, by the courtesy of the Morgan Engineering Co., Alliance, O., enabled to present illustrations and descriptions of a few typical installations of each type.

The overhead type consists essentially of a set of crane girders traveling on crane runways and carrying a trolley adapted to rack back and forth on these girders. From this trolley is suspended a column or frame-work carrying the charging bar which picks up the boxes full of raw material, inserts them in the furnaces, dumps them and then returns them to the charging car on which they are transferred from the stockpile to the furnaces.

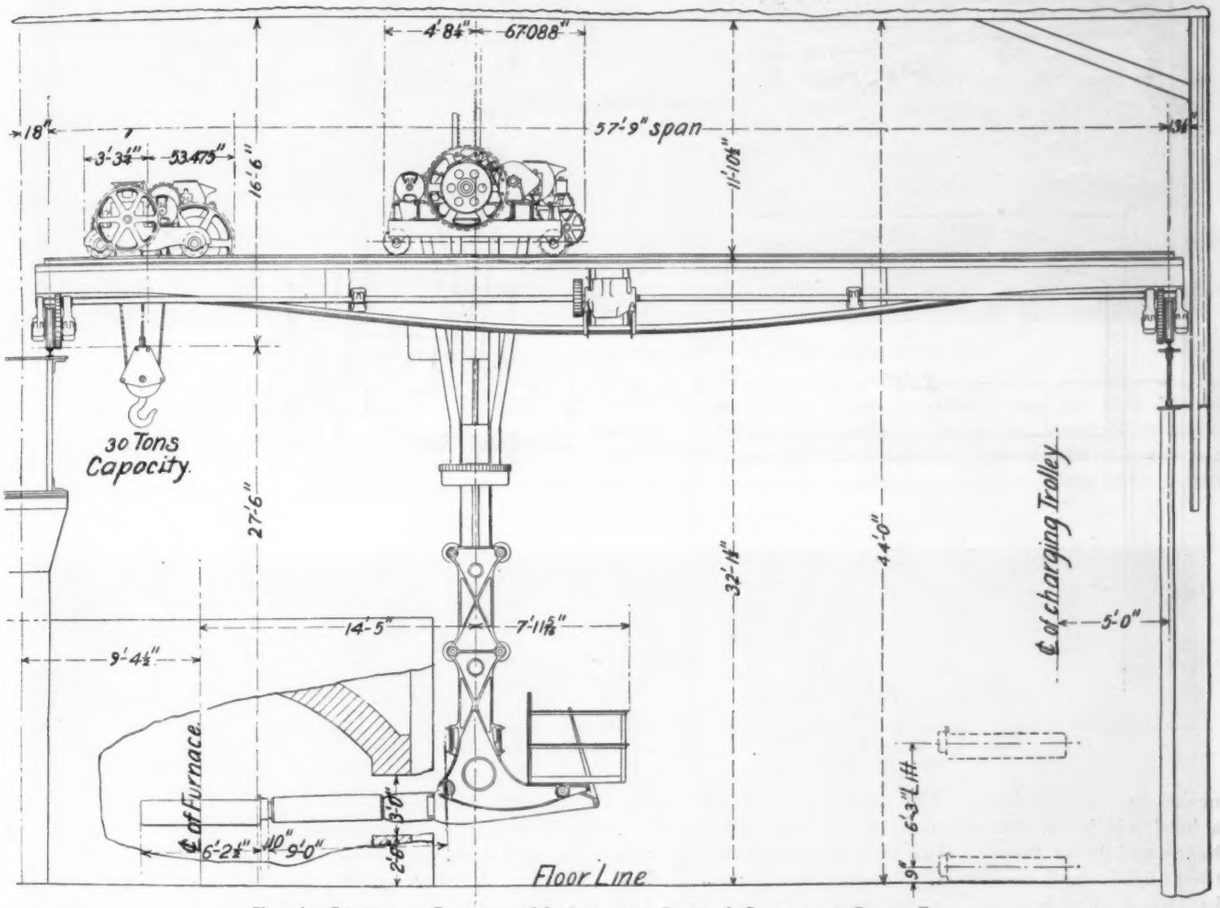


FIG. 1—OVERHEAD CHARGING MACHINE AT JONES & LAUGHLIN STEEL CO.

The high type floor machine and the low type floor machine are similar in that they both travel along rails laid on the floor instead of on elevated runways. At this point, however, the similarity ceases. The high type machine comprises a pair of plate girders near the floor spanning the rails and riveted to four columns which carry a pair of box girders at a considerable elevation above the floor level. It is on this pair of box girders that the trolley travels, the charging bar being suspended from it by a suitable framework.

The low type floor charging machine consists of essentially a pair of plate girders spanning the rails and suitably attached to each other. The trolley to which the charging bar is directly attached rides on the upper flanges of the girders, provision being made to prevent tilting, as will be shown later.

The different types have advantages peculiar to themselves, which adapt them for various locations. The overhead type is desirable when the floor space in front of the furnaces is limited, and where it is necessary to bring locomotives and cars in on the floor. It has the disadvantage, however, of blocking, to some extent, the crane service, inasmuch as it is necessary to run the charging machine to the end of the plant in order to give a crane access to the whole floor. An auxiliary trolley is sometimes fitted to the charging machine, permitting it to be used as a crane, but this is not altogether desirable.

Both floor types of machine give clear room for crane service, but require quite heavy floor construction to carry the weight of the charging machine. The high type does not require such a wide wheel base as the low type, inasmuch as the trolley is carried on the upper box girders, which can be extended over the tracks in order to give the requisite travel to it. This allows small locomotives and cars to pass underneath the box girders of the machine. The high type, however, does not readily permit the carrying of bulky material over it, such as ladles

of metal, etc., owing to the limited head room. This can be done with the low type of machine, which, on the other hand, will block the passage of locomotives and cars to a greater extent.

The operation of all three types is practically the same. The charging bar, which picks up the charging boxes filled with material, is a steel forging and made in two parts, so that the outer end may be easily renewed, in case of damage. It carries a head which fits into recesses in the boxes and locks therein, thus holding them firmly and permitting them to be turned up side down for dumping. This is accomplished by rotating the bar on its axis by means of a motor. The charging bar frame has trunnions at its points of suspension from the trolley, which trunnions are placed near the middle point of the bar, allowing it to oscillate to a considerable angle. The trolley carries a motor which drives a crank shaft and connecting rod through a train of gearing, the connecting rod being attached to the rear end of the charging bar, thus giving the oscillatory motion to the bar.

The operator's platform is carried on the back end of the trolley, and in addition to the operator carries the controllers for all motions of the machine and a lever for locking the charging box to the bar.

The sequence of operations carried out by the machine is about as follows: A train of flat cars loaded with charging boxes is placed between the machine and the furnace and the machine is moved until the end of the charging bar is opposite the opening in the box to be charged. By suitable manipulation of the various motors the end of the charging bar is placed in the recess in the charging box and locked therein. If the charging box does not happen to lie exactly in front of the door of the furnace into which it is to be charged the machine is moved along the track to the proper place, pushing the whole train of cars with it, the machine being provided with traverse motors of ample power to do this. When in the proper place the lifting motor, which is connected to the charging bar by means of the crank shaft and connecting rod above mentioned, is started lifting the forward end of the charging bar and with it the box from the car. The furnace door is lifted and the box run into the furnace by moving the trolley forward and the charging bar rotated, thus inverting the box and emptying its contents into the furnace. The traverse motor is then reversed, the machine run out of the furnace and the empty box deposited on the car, when the operation is repeated. The charging boxes are usually made in varying sizes ranging from 5 to 8 feet in length.

The line drawings, Figs. 1 and 2, show two types of overhead charging machines installed, respectively, at the plants of Jones & Laughlin Steel Co., Pittsburg, and Inland Steel Co., Indiana Harbor, Ind.

The principal point of difference between these machines is that the charging bar is, in one case, carried by a column suspended from the trolley, and in the other by means of a structural framework. In the machine shown in Fig. 1, the column has a vertical movement provided by a motor driving the racks shown projecting above the trolley. This is in addition to the oscillating motion of the bar in Fig. 2. The structural framework remains stationary as regards vertical motion and the only vertical movement provided is the oscillating motion of the charging bar.

The illustration, Fig. 3, shows a floor charging machine of the high

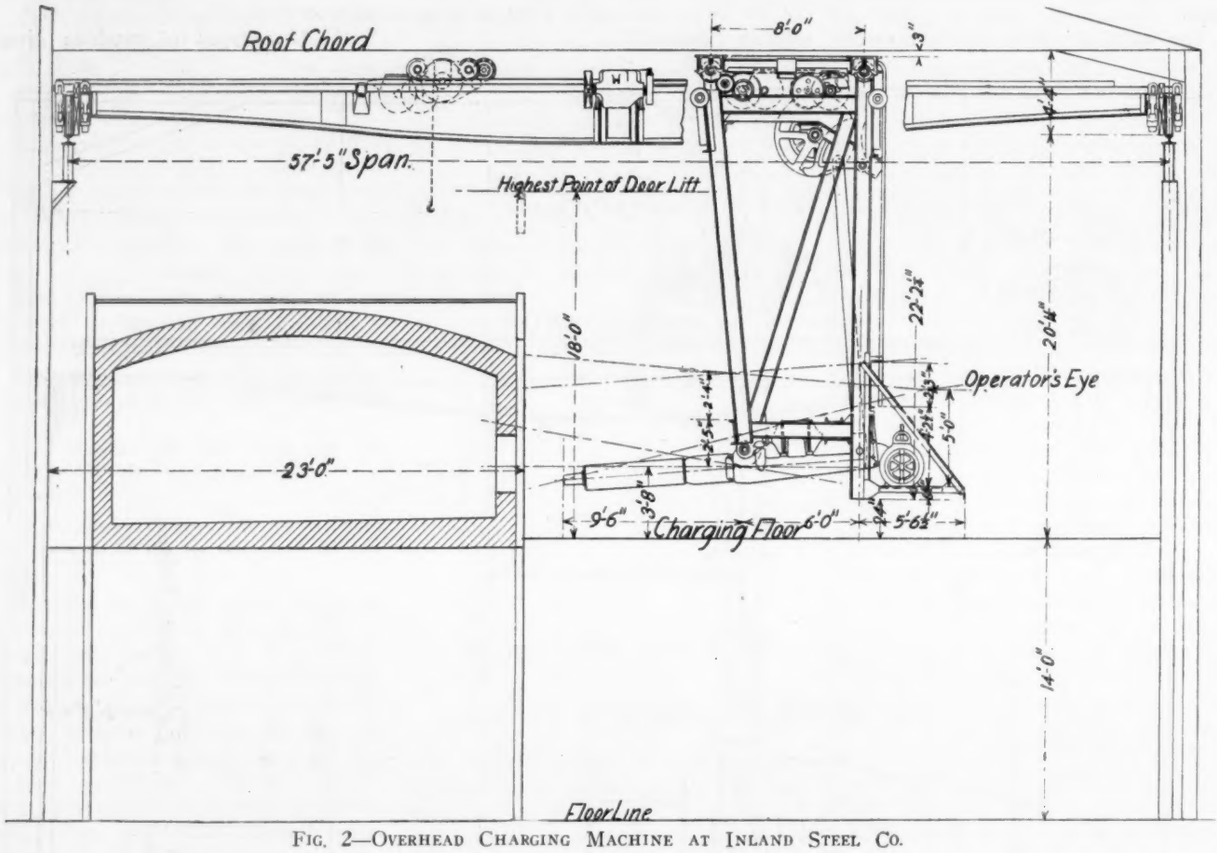


FIG. 2—OVERHEAD CHARGING MACHINE AT INLAND STEEL CO.

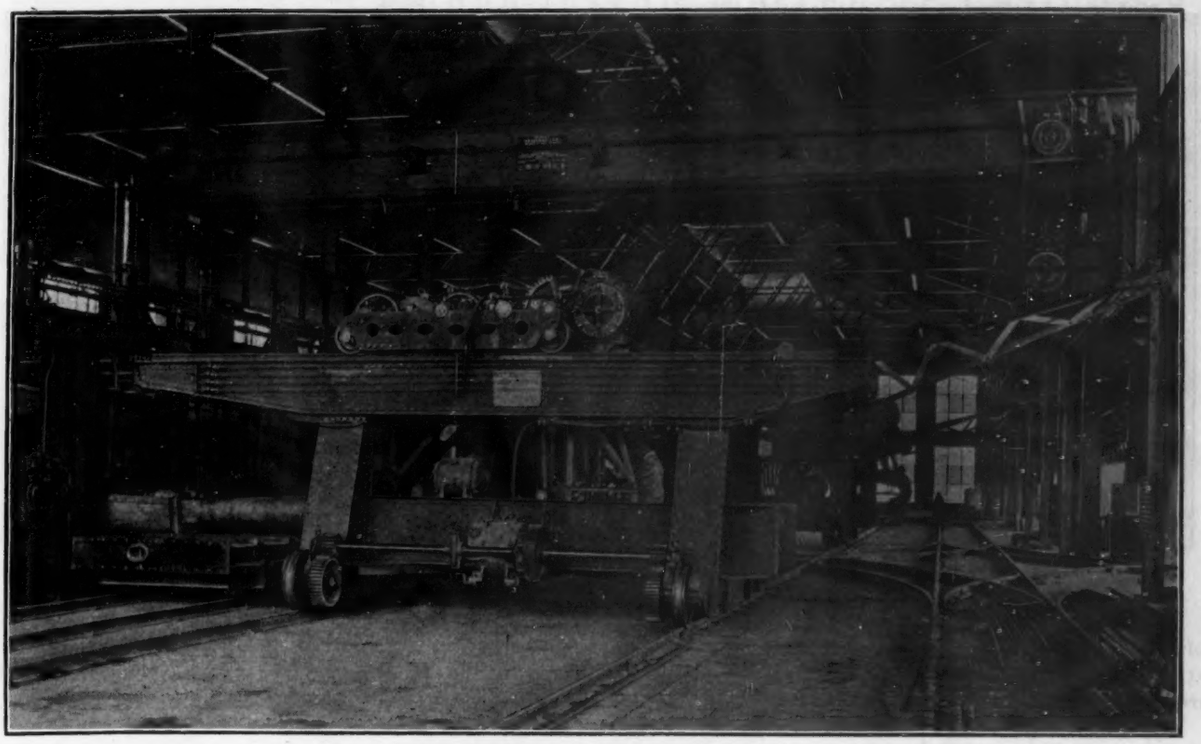


FIG. 3—HIGH TYPE FLOOR CHARGING MACHINE AT LACKAWANNA STEEL CO.

type installed at the plant of the Lackawanna Steel Co., Buffalo, N. Y. The charging bar in this case is suspended from the trolley by means of a pair of inverted A-frames, which can be seen in the illustration, Fig. 3. This machine is moved along the face of the furnace by means of a motor which may be seen at the middle point of the lower plate girder and which is geared to the traction wheels. Current is taken from a pair

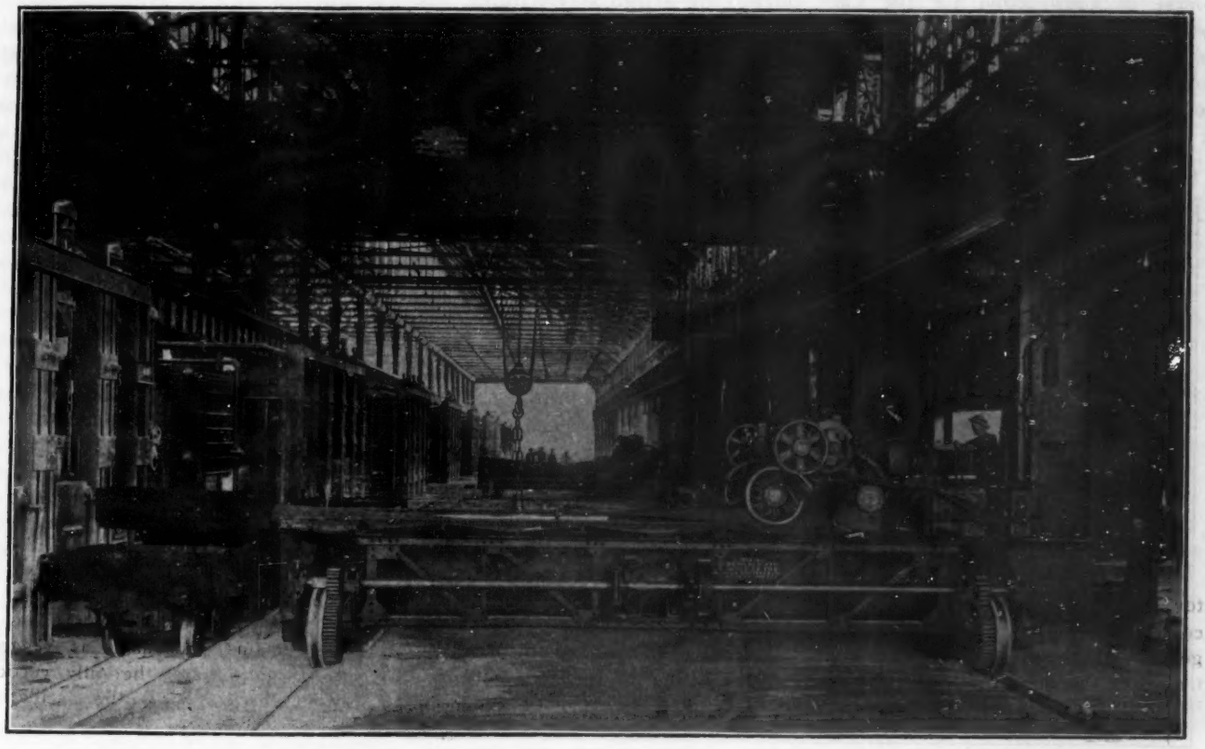


FIG. 4—LOW TYPE FLOOR CHARGING MACHINE AT OPEN-HEARTH NO. 4, HOMESTEAD WORKS, CARNEGIE STEEL CO.

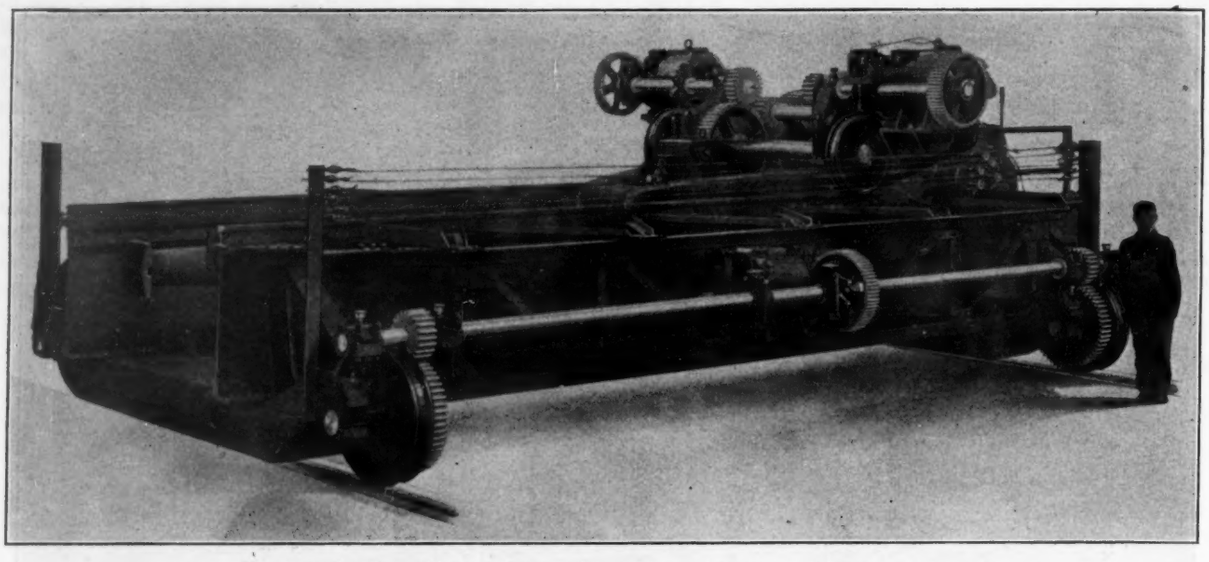


FIG. 5—NEAR VIEW OF LOW TYPE FLOOR CHARGING MACHINE.

of trolley wires attached to the wall at the rear of the machine, a lattice trolley being used.

Fig. 4 shows the low floor type charging machine installed at open-hearth No. 4 at the Homestead works of the Carnegie Steel Co., it being one of three similar machines. Machines of this type have also been installed at the plants of the Bethlehem Steel Co., and the Pennsylvania Steel Co., and other machines are in course of construction for the Carnegie Steel Co.'s Duquesne Works, and also for the same company's Ohio works at Youngstown, and for the Jones & Laughlin Steel Co. This is one of the latest charging machines built and a somewhat detailed description of it will prove of interest. The machine is constructed entirely of steel forgings and castings, practically no iron whatever being used. Its span from center to center of rails is 22 feet 8 inches, and it has a wheel base of 14 feet. The total height over all is about 8 feet 3 inches. It is provided with five motors, each of 25 horsepower, two of these being the main traverse motors, the other three being known as the lifting, trolley traverse and charging bar rotating motors, respectively. Of the two main traverse motors, only one is used ordinarily, the second one being held in reserve. At full working load the main traverse speed is 350 feet per minute, which can be increased under decreasing load until at no load the speed is 400 feet per minute. The speed of lift at full load is, approximately, 50 feet per minute. The speed of the trolley traverse at full load is 200 feet per minute, increasing to 250 feet at no load. The charging bar can be rotated about 12 revolutions per minute.

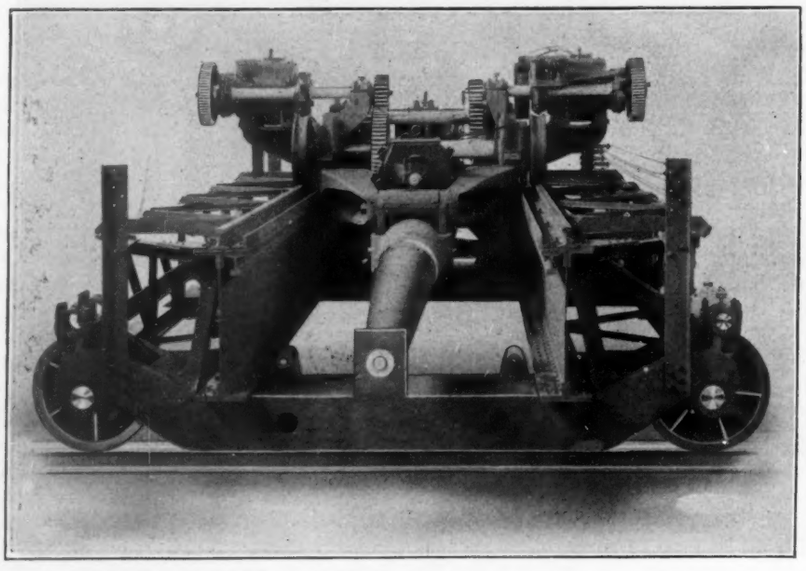


FIG. 6—FRONT VIEW OF LOW TYPE FLOOR CHARGING MACHINE.

The armature of the lifting motor is provided with an automatic electric brake operated by solenoids in such a manner that should the current fail from any cause the brake will immediately act and prevent the load from falling. The action of the brake is due to gravity and it does not depend upon springs or other mechanical arrangements. The traverse wheels and the trolley track wheels are steel castings machined on the tread and keyed to the axles, the axles revolving in bronze bearings. All gears used on the machine are of steel with cut teeth.

To prevent tilting of the trolley, when a charging box is attached to the outer end of the charging bar, a pair of wheels is provided which run on the inverted T-rail set on the under side of the upper flange of the girders as shown in Fig. 6. The operator rides on the back end of the trolley and has an unobstructed vision of the charging box and bar, the machinery being at either side of the machine.

The illustration, Fig. 7, shows a modification of the low type of charging machine, which was installed at

the plant of the New York State Steel Co., Buffalo. This modification comprises a turntable, which allows the charging bar to be rotated, so as to pick up the charging boxes from a track at right angles to the line of the furnaces. This modification was made necessary by local conditions in the plant and necessitated the addition of an extra motor for operating the turntable. It is not regarded as a desirable feature, inasmuch as considerable time is lost every time a box is picked up, compared with the operation of the straight line machines.

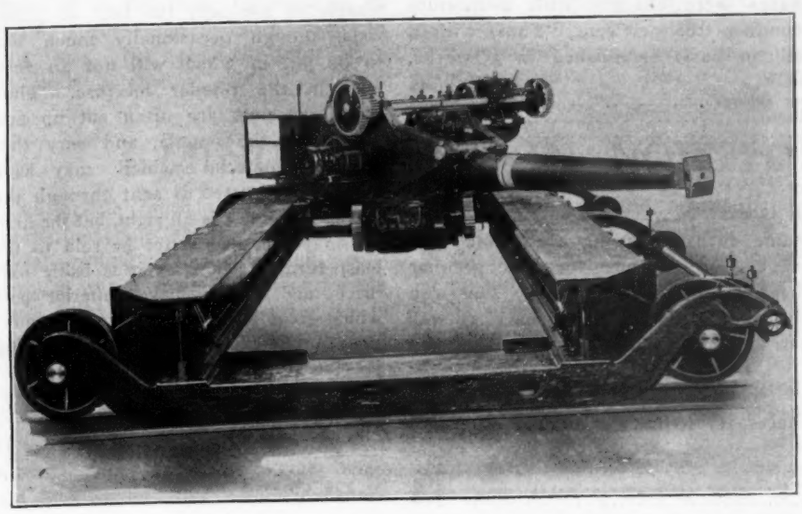


FIG. 7—LOW TYPE FLOOR CHARGING MACHINE AT NEW YORK STATE STEEL CO.

Childress Shop Fire.—The Ft. Worth & Denver City Railway Co. suffered a loss of $100,000 through the damage of its shops by fire at Childress, Tex., May 16. The loss was partially covered by insurance. The shops worst damaged were the machine, boiler and blacksmith shops. The company advises that it expects to replace all tools totally damaged and repair those partially damaged. It is planned also to change the general power plant from belt driven to electric driven. This it is figured will require about 200-kilowatt generators. The number of motors has not yet been determined.

President William V. Kelley, of the American Steel Foundries, has purchased for $490,000, the land and building known as the Central Union property at Madison and Market streets, Chicago. The lot has a frontage of 200 feet on Market street and 194 feet on Madison street and contains a six-story brick building of mill construction. It is the intention of the purchaser to materially improve the conditions in this building.

PRODUCTION OF MALLEABLE CASTINGS-V

Mixtures for Making Various Grades of Malleables and Methods of Calculating the Furnace Charges

BY RICHARD MOLDENKE.

Ordinarily a malleable works has but one mixture running at a time. Where, however, attention is paid to the niceties of the art, and customers are given more nearly what they should have, especially with the open-hearth furnace, several mixtures may be run right along.

For instance, taking the most advanced practice, every time an open-hearth furnace has been rebuilt and heated up preparatory to making malleable, it is advisable to run a "pill heat" through it. This, pigged for subsequent use as sprues, merely serves to get the furnace into proper working shape, and tells the melter if everything is working properly about his furnace. It forms a sort of insurance for good malleable next time.

Again, running over Sunday, the furnaces are apt to be a little colder than they should be, and hence a "Monday morning heat." Then of course the "regular heat" of daily practice. When a good customer wants specially soft iron, a "special heat" is made which contains no steel scrap, and is higher in silicon than the ordinary mixture. The castings are by no means as strong, but they thread and machine nicely.

Next comes a "pot mixture," run in either the air, open-hearth, or cupola furnace. In the case of the cupola, less silicon is burnt out, hence the mixture is arranged accordingly.

"Sprue heats" are sometimes made when things go wrong in the works, in this case pig iron only as a rule forms the material melted.

It will be seen, therefore, that mixing can be made a fine art; and yet once the principles of the operation, as explained in the previous chapter so far as the materials used are concerned, are understood, the work is so simple that every foundryman can master the details in short order.

Calculating a Mixture.

Commencing then with the regular mixture. Take first an easy one from the old days of charcoal iron, with no scrap other than the regular sprues. The work required consisted of couplers, the silicon wanted was 0.55 per cent in the mixture, to give from 0.30 to 0.40 per cent in the castings. Here is what was used:

Brand.	Amount, pounds.	Silicon in brand, per cent.	Silicon in mixture, pounds.
Pioneer, No. 2.....	2,000	0.90	18.0
Elk Rapids, No. 2...	1,000	1.00	10.0
Antrim, No. 2.....	1,000	0.76	7.6
Hinckle, No. 3.....	2,000	0.77	15.4
Antrim, No. 3.....	2,000	0.76	15.2
Pioneer, No. 3.....	1,000	0.61	6.1
Hinckle, No. 4.....	1,000	0.48	4.8
Sprues	9,000	0.30	27.0
Total	19,000		104.1

Or, every thousand pounds carried 5.5 pounds of silicon, or in other words the mixture 0.55 per cent. Now, in running about 10 heats a day in 10-ton furnaces of the open-hearth type, the resulting castings contained 0.35 per cent silicon and annealed first class. This mixture is given merely to show how low in silicon one can go and still get good work, provided the heats are quick, charcoal irons are used, and only domestic sprues enter the mixture. There are some works still so situated that they can use the above, or the equivalent, for their heavy castings.

Mixtures Under Modern Conditions.

Turning to more modern conditions and studying the method of mixture calculation at the same time, let us consider, for instance, the following points as fixed. The silicon wanted in the mixture to be 0.80 per cent, so that when melted and cast the work may turn out about 0.50 per cent (for fairly heavy work), 21,500 pounds to be used to the charge (for 10-ton furnace running under pressure of work); 250 pounds each of steel and gray iron scrap to be in the mixture, as well as 3,000 pounds of malleable scrap; the percentage of sprues at the time being 8,000 pounds, thus keeping the sprue pile normal. These are conditions imposed upon the plant by the supplies on hand. It will be seen that in order to use that much iron in the furnace—its

maximum at the time—with the steel to improve the metal, and the gray iron scrap to get rid of that amount on hand, and 3,000 pounds of malleable scrap which takes care of the supply of that material coming in at the time, only 10,000 pounds of the charge is pig iron, or a little less than one-half.

With 21,500 pounds of metal to contain 0.80 per cent silicon, the total silicon in the mixture must be 21,500 × 0.80, or 172.0 pounds. Taking first the fixed conditions of scrap, we have:

Pounds.		Pounds.
8,000	sprues (containing by analysis 0.50 per cent silicon)	40.0
3,000	malleable scrap (estimated 0.40 per cent silicon)	12.0
250	steel scrap (estimated at no silicon)	....
250	gray iron scrap, heavy (estimated at 1.00 per cent silicon)	2.5
11,500	metal, containing silicon	54.5

This leaves 21,500 minus 11,500, or 10,000 pounds of pig iron with 172.0 minus 54.5, or 117.5 pounds of silicon to be provided to bring the mixture out right. Looking over our pig iron sheets we find that it is desirable to cut down the quantity of "D," "B," and "N," so we take say, 2,000 pounds of each, and have:

Pounds.		Pounds.
2,000	"D" (Antrim, with 1.00 per cent silicon)	20.0
2,000	"B" (Spearman, with 1.25 per cent silicon)	25.0
2,000	"N" (Mabel, with 1.25 per cent silicon)	25.0
6,000	metal, containing silicon	70.0

Adding this to the above we have now 17,500 pounds of metal with 114.5 pounds of silicon provided for, leaving 21,500 minus 17,500, or 4,000 pounds of pig iron, with 172.0 minus 124.5, or 47.5 pounds of silicon still to be added.

We come now to making combinations with what we have left in the yard to get these 4,000 pounds of pig to contain as nearly as may be the 47.5 pounds of silicon. In the particular mixture in question, this proved to be the following:

Pounds.		Pounds.
3,500	"G" (Briar Hill, with 1.25 per cent silicon)	3.7
500	"K" (Ella, with 0.75 per cent silicon)	43.8
4,000	metal, containing silicon	47.5

Thus, adding all the metal together, it happens we hit the exact amount, which is rather exceptional, usually a variation of a few pounds of silicon is unavoidable. Tabulating the several items we have the following:

Brand.	Amount, pounds.	Silicon in brand, per cent.	Silicon in mixture, pounds.
"D"	2,000	1.00	20.0
"B"	2,000	1.25	25.0
"N"	2,000	1.25	25.0
"K"	500	0.75	3.7
"G"	3,500	1.25	43.8
Sprues	8,000	0.50	40.0
Malleable scrap	3,000	0.40	12.0
Steel scrap	250	....	....
Gray iron scrap	250	1.00	2.5
	21,500		172.0

Dividing the 172 by 21,500, we get the silicon of the mixture 0.80 per cent.

The Castings.

This mixture gave castings with 0.50 per cent silicon, which annealed all right. It was used in all the morning heats for 10 furnaces. For the afternoon heats, as the furnaces were much hotter, occasionally the silicon had to be cut down a little and the silicon of the mixture made to run 0.75 per cent. On the other hand for Monday morning all the furnaces were charged with a mixture running 0.85 per cent. Thus, with a silicon basis established in a works, it is easy to vary the mixture for the same furnaces, using the same tonnage, and provide for the peculiar heat conditions obtaining. This can be done with the air furnace as well as with the open-hearth.

Limited Number of Brands.

To show that it is by no means necessary to have a number of brands in a mixture, though advisable to pile the metal according to analysis, many cars on one pile, the following mixture is appended, which gave very strong and good castings:

Brand.	Amount, pounds.	Silicon in brand, per cent.	Silicon in mixture, pounds.
"O" (Mabel)	8,000	1.00	80.0
"E" (Mabel)	3,000	1.25	37.5
Malleable scrap	2,500	0.40	10.0
Steel scrap	500	....	....
Sprues	7,500	0.55	41.2
	21,500		168.7

Dividing 168.7 by the 21,500 pounds of metal we have the mixture containing 0.78 per cent of silicon, and only one brand of pig iron used.

The making of special heats is carried on just as the above example. It may be desirable to leave out the steel or reduce the malleable scrap or in some other way attain the desired result. When a new iron is to be tried, the method shown in the last example should be followed out. That is to retain the sprues, scrap, steel, etc., and substitute for the pig iron as much of the new iron as can be gotten in without upsetting the silicon balance. Cast the heat, and collect all the sprues for the next heat with the new iron. This will sufficiently impress the resulting castings, and by the strength of the test bars made, a very fair idea of the value of the new iron obtained.

Making Annealing Pots.

In making annealing pots it is advisable to use only the best of materials, though occasionally much has to be put in which will not do very well in the regular mixture. Thus the scrap pots are often cut up and melted in the cupola, and very thin annealed material which may have been badly rusted is sent through the cupola. The last is all right, but the first, or scrap pot, had better be sold to the blast furnace again, as it is badly oxidized, and always makes inferior pots which soon burn out. Here is a mixture for the cupola for making annealing pots:

Lbs.		Lbs. Si.
2,000	"N" (Mabel, 1.25 per cent Si.)	25.0
3,000	Malleable scrap (0.40 per cent Si.)	12.0
5,000		37.0

or 0.74 silicon in the mixture.

As a general rule, where there are enough furnaces to take care of the current work, all extra iron is cast into annealing pots, and thus the cupola is used only occasionally. While this is convenient it is not altogether advisable, as in the first place the air furnace or open-hearth iron costs more, and cupola iron though inferior in strength as malleable when annealed, will withstand high temperatures better, being much closer in structure. It is therefore better to run the heats close to the floor requirements, and to start the cupola so many days a week as may be required for the supply of pots and stools.

"Pill Heat."

There remains only the so-called "pill heat," the pigs from which, if the furnace worked properly, are so much "sprues." If the furnace showed signs of trouble, this would have to be corrected before going any further.

Here is a mixture for this purpose:

	Pounds.		Pounds.
"T" (Briar Hill 0.75 per cent silicon)	10,000	with	75.0 silicon
"X" (Excelsior 1.00 per cent silicon)	6,000	with	60.0 silicon
	16,000	with	135.0 silicon

The silicon in the mixture is 0.84 per cent. It will be noted that the silicon is fairly high, and the amount of the charge smaller than the capacity of a 10-ton furnace, the only object being

to get a newly built, or rebuilt furnace into proper working conditions.

Once in a while, the bottom of a furnace gets high and in bad condition, and rather than tear it out and thus put the furnace out of commission for a while, a small heat of the worst iron available is charged and deliberately burned. The oxide of iron thus formed cuts the sand bottom, and the slag running off leaves it in the shape for building up again. Limestone is also used in this way, but requires great care as it is active on a sand bottom.

Conclusions.

In conclusion it may be said that close attention to the scrap piles, the mixture requirements to make the proper classes of malleable, and the buying of irons to keep the minimum of metal piled up in the yard without being caught unprepared through slow deliveries, constitute the art of getting results without having to resort to the purchase of cheap irons which mean bad malleable every time. A good laboratory, and still better a good metallurgist pay over and over again in a malleable shop even with an output as small as 10 tons a day of finished castings.

It is understood, of course, that where a works requires a silicon higher than the examples cited, the mixture is arranged accordingly. The mixtures quoted happen to be actual ones giving fine results and have been selected in view of the tendency existing to use too much silicon for malleable castings today, partly through fear of getting it too low, and also through ignorance of the fact that the lower ranges give the strongest metal.

MINING TALC IN NORTH CAROLINA

An article much used about steel works, machine shops, and in other metal-working industries, and concerning whose origin, comparatively little is known by those using it, is the ordinary talc crayon, sometimes called "soapstone," used for marking metal. The common notion is that it is a manufactured product—just how it is made is not known—but there is a vague idea that certain ingredients are compounded, and certain processes followed out, and the result is the crayon which is found in the hands of nearly every metal worker.

That the crayon is a mineral product that finds its way into the hands of the user in its natural state, with no other process than the sawing of it to shape, will be a source of surprise to many of those who handle it daily. Yet such is the case. The crayon is composed of pure talc, which, chemically, is silicate of magnesia, and which is fond in large deposits in the mountains in the western end of North Carolina. One of the largest and purest deposits in the world is at Hewitts, N. C., located on the Murphy branch of the Southern railway, 94 miles west of Asheville. It is owned and worked by the North Carolina Talc & Mining Co., with general offices at Hewitts.

The securing of talc is a mining proposition, pure and simple. The deposit lies in an irregular vein of varying thickness, and with a pitch, roughly, of 15 degrees to the horiontal. It

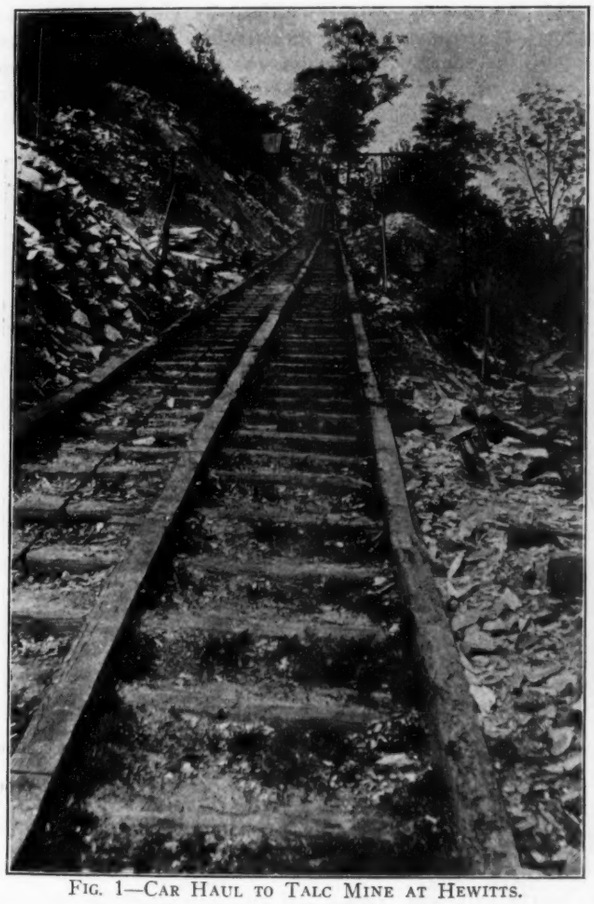


FIG. 1—CAR HAUL TO TALC MINE AT HEWITTS.

FIG. 2—OPEN QUARRY TALC MINE AT HEWITTS.

outcrops at the crest of the mountain, and was originally worked as a quarry. As the deposit near the surface worked out, it was necessary to resort to tunneling from the face of the hill, with cross cuts in the vein, and lately a shaft has been sunk in the valley, by means of which it is proposed to pursue the mining at points impossible of access by tunnels.

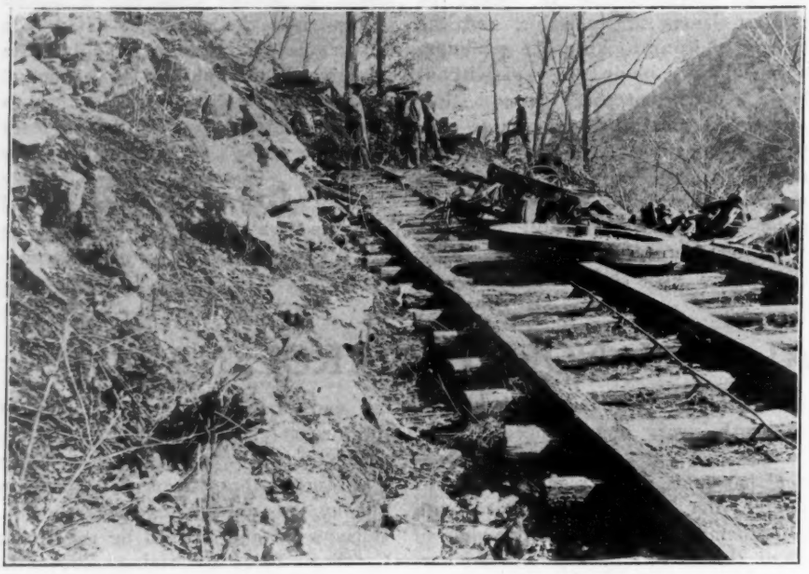


FIG. 3—EFFECT OF A SLIDE ON CAR HAUL.

Location.

The locality is one of surpassing grandeur which, however, from its very nature adds to the difficulty of the undertaking, and also owing to natural conditions, the methods of mining are of the most primitive character. The mines are located on the Nantahela river, which flows in a narrow valley, barely wide enough for the river and the single track railroad. The mountains extend about 1,800 feet above the river's surface, and are extremely rough and steep. The talc is found only on one side of the river, at a distance in from the surface of the mountain of about 75 feet. There is a heavy overburden of earth, then a wall of marble, behind which is found the talc. The vein is approximately 30 feet through by 40 feet high, although in places it pinches out to but a few inches in thickness. It will then suddenly widen out to the maximum thickness of the vein. This irregularity in the vein makes prospecting a most unsatisfactory operation, as a drilling may show almost no talc whatever, while another, but a few inches away, may show talc 20 to 40 feet thick. The only practicable way of mining is to tunnel into the talc and then follow the vein wherever it leads. The above conditions render out of the question an estimate of the amount still unworked.

Prospecting.

Such prospecting as is done is carried on by means of hydraulic mining. Plenty of water for this purpose is available from the numerous streams flowing down the face of the mountain. When it is desired to prospect, a stream is dammed at the proper elevation and a pipe line carried down to where it is needed for prospecting. A three-inch hose and nozzle give a stream of water sufficiently powerful to wash away the overburden and break through the marble and expose the talc which may be behind. Tunneling is then resorted to, to bring it out.

Method of Mining.

At present, about seven tunnels are being worked. These are located all along the hill, following closely the slope of the vein. Each tunnel is driven in to about the middle of the vein, and then a cross cut is started at right angles to the tunnel and extending in both directions. These cross cuts follow the slope of the talc, and it is necessary to raise the talc from the lower cross cut to the tunnel. If the slope is not too steep, wheelbarrows are used. Otherwise, a bucket is employed, being pulled up by a block and tackle. The talc from the upper cross cut is brought to the tunnel by means of chutes, made of planks. In the tunnel, the talc is loaded into wheelbarrows and conveyed to the surface of the mountain.

From the base of the mountain a double-track car haul extends to an elevation of about 500 feet. This is operated by gravity, the loaded car, as it descends, pulling the empty one up. The tracks are simply square timbers laid on cross ties. The talc from the various tunnels is brought to the car haul by chutes, which discharge directly into the cars. At the bottom of the haul, the cars dump into a chute which carries the talc across the railroad track to the mill.

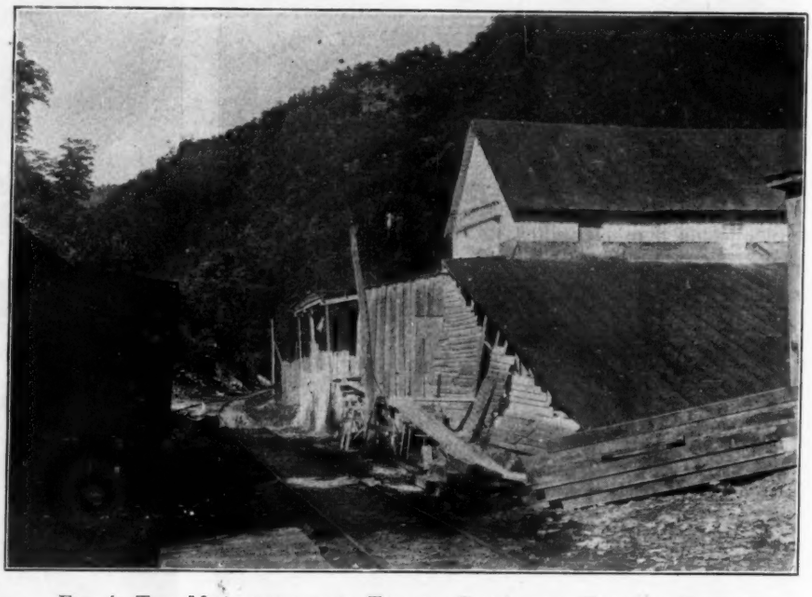


FIG. 4—THE MILL WHERE THE TALC IS SAWED INTO FINISHED PRODUCT.

The talc is taken out of the vein by blasting. Hand driling is employed in most of the mines, although there are some power drills installed—both steam and air. Owing to the slippery

nature of the substance, together with its formation in regard to the overburden, extensive timbering is necessary throughout the tunnels, cross cuts and shaft.

Shaft Work.

The shaft at present being sunk is on the very edge of the river. It now has a depth of about 90 feet, and owing to its being much below the river bed, considerable trouble has been occasioned by water. It was found necessary to build a stout cofferdam of sheet piling, which, however, is insufficient to keep out all the water, and continuous pumping is necessary. Two pumps are kept at work constantly. It is proposed to sink the shaft about 25 feet more and then to tunnel into the talc vein at an elevation considerably above the tunnel bottom. The lower portion of the shaft will thus form a sump into which the tunnels will drain, and where the pump will be permanently installed. This will insure the workings being free from water at all times.

The power house for the shaft is located immediately adjoining it, and consists of a pair of locomotive boilers and a hoisting engine for manipulating the bucket in which the spoil from the shaft is raised. These boilers also furnish steam for the steam drills. Air for the air drills is compressed in an air compressor in the mill, which is operated by water power.

Finishing.

In making the crayons the only machine required is a circular saw. The talc comes from the mine in pieces varying from a foot in length by 3 or 4 inches thick down to powder. The larger pieces are sawed into slabs, which are again sawed into crayon pencils. About 20 saws are constantly employed in this work. After sawing to size, the pencils are sorted by girls and packed in boxes, each holding a gross, and are shipped.

The smaller pieces, too small for pencils, may be used as the basis for making the lava tips used in gas jet burners. These are also sawed from scraps left over after sawing out the pencils.

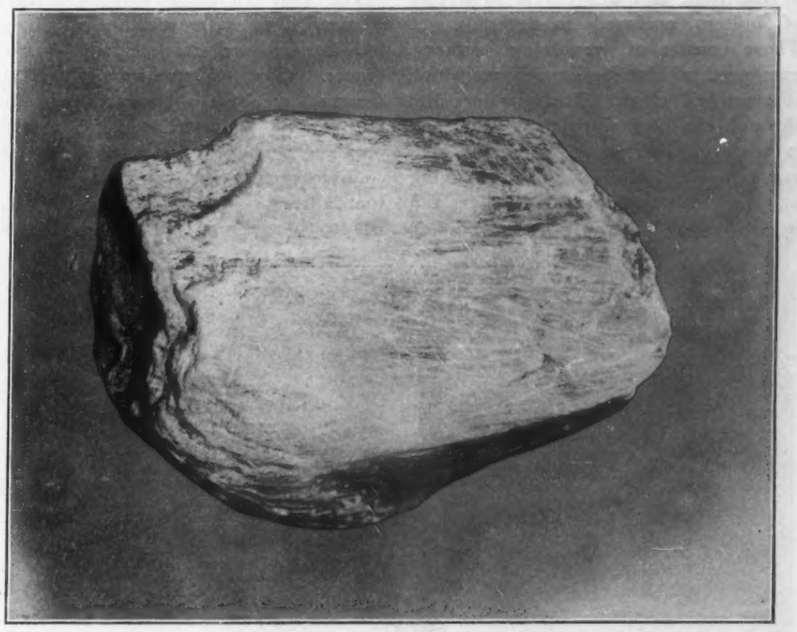


FIG. 5—APPEARANCE OF THE TALC AS TAKEN FROM THE MINE; ABOUT 1/3 SIZE.

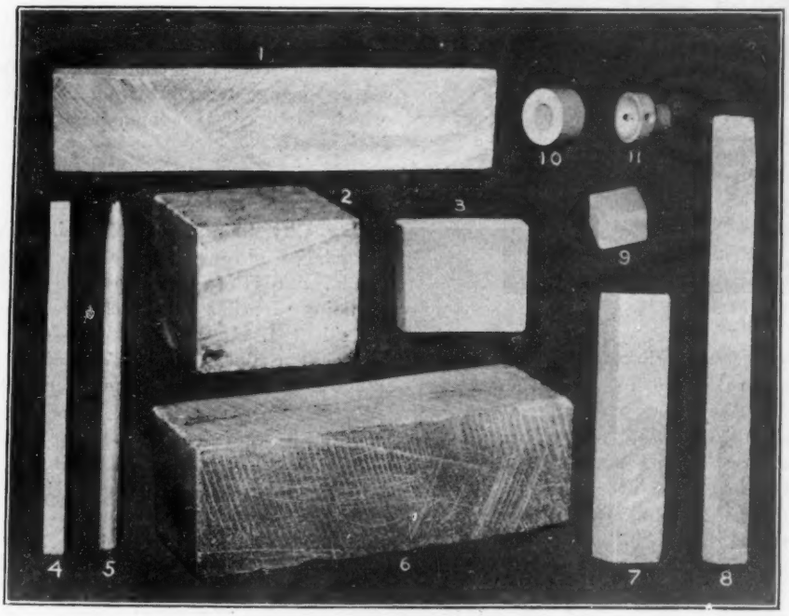


FIG. 6—FINISHED TALC PRODUCTS.

1, 4, 5, 7, 8—Crayons; 2, 6—Blocks for Making Electric Insulators; 3—Tailors' Chalk; 9—Block for Making Gas Burner Tip; 10—Blank for Making Acetylene Burner; 11—Finished Acetylene Burner.

Another use for the talc is the making of insulators of a special grade for electrical work. Pieces of the requisite size are sawed out and shipped, principally to Chattanooga for finishing. The talc works up as easily as soft metal or wood and may be turned in a lathe or formed in any suitable manner. After forming, the talc is burned for about 24 hours in a specially designed coal fired furnace, reaching a temperature of about 2,500 degrees Fahr., which renders it extremely hard and completely changes its nature.

The accompanying illustrations show some of the shapes to which the raw talc is sawed, and also some of the products obtained by burning it.

Talc Powder.

The talc industry is one in which there is absolutely no waste. The scraps left over from one operation can often be sawed up into pieces for other uses. When the scraps finally become too small for further sawing, they are ground to a powder, which forms the basis of the many well known talcum powders found in common use.

The scraps from the saws, together with small chips from the mines, and powder which is formed by the abrasion of the pieces on each other in the cuts, are put through a crusher, and then through four burr mills, which reduce them to a fine powder.

A screw conveyor running under the mills conveys the powder to an elevator which raises it to the third floor of the mill, and delivers it to a pair of bolters enclosed in tight boxes. These consist of revolving screens, composed of circular frames on which is stretched cloth. The powder sifts through the cloth into the boxes, and is removed therefrom by screw conveyors, which deliver it to bagging machines on the floor below. Dirt and impurities are removed at one portion of the bolter, and the tailings, consisting of pieces too large to pass through the cloth, pass into a chute leading to the mills, where they are reground.

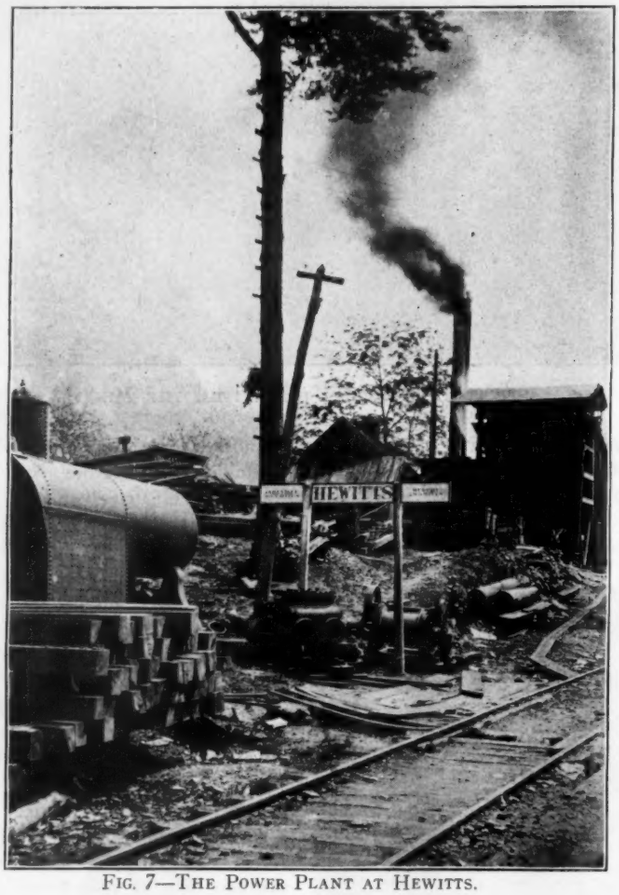


FIG. 7—THE POWER PLANT AT HEWITTS.

From each bolter box is led a pipe, in which is an exhaust fan. This fan discharges into a room with cloth walls, known as the float room. The fan draws air from the boxes, and with it the talc dust which is so fine as to float in the air instead of falling to the floor from the bolter. The dust finally settles in the float room, and forms the highest grade of talc powder. It is one of the most impalpable powders that can be obtained, and owing to its limited quantity, commands a much higher price than the ordinary powder obtained from the bolters.

The Mill.

The mill is a frame building of three stories. Two water turbines of 90 and 140 horsepower, respectively, furnish power. The Nantahela river is dammed a short distance above the mill, and a head of about 15 feet is obtained. The driving is by belts and countershafts with the exception of the bolters, elevators and conveyors, which use a chain belt drive. A dynamo for lighting and the air compressor are belted to the turbines. Owing to the dusty condition of the mill, and to the dead white color on the interior due to the heavy coating of talc dust over everything, it was impossible to obtain satisfactory photographs.

The Nature of Talc.

As above mentioned, pure talc is silicate of magnesia, its chemical formula being SiO_2 MgO H_2O. In its impure form it is known as soapstone, which is much harder than talc. Physically talc is a soft, bluish colored mineral, although the color varies to a dead white or pinkish white. The latter color is due to its physical mixture with clay. In soapstone, the impurities are chemically combined, and render it hard. Physically mixed, they render it softer than the pure substance. The harder grades are made into pencils, lava tips, electrical insulators, etc. The softer grades are suitable for marking on soft substances, tailor's chalk being an instance of the dead white talc. Another form of talc is, when sawed into thin strips, translucent and almost transparent. In the mine, with artificial light, the talc has a beautiful blue color, which, however, becomes grayish blue in natural light. Talc is not affected by water or weather excepting that it is very sensitive to freezing. When frozen, it checks and cracks, and is unsuitable for burning. Talc which has been frozen will reveal the fact by this checking and cracking.

Companies Are Fined.—Pleas of guilty to indictments charging a conspiracy in restraint of trade were entered June 12 in common pleas court, at Lima, O., after an all-day argument by the attorneys for the Chapman, Bellefontaine, Brackett, Mt. Vernon, Oregonia, Huston, Cleveland and John P. Cowing companies. Each company was fined $250 and costs, and indictments against directors and officers as individuals were nolled. Harry G. Hammond, agent, pleaded guilty and was fined $50. This completes all the alleged bridge trust litigation at Lima, which involved 23 companies and 50 individuals.

Bay City Ship Yards Closed.—The permanent closing of the Bay City, Mich., yards of the American Ship Building Co. has been announced by President J. C. Wallace, of the company. The machinery of the Bay City plant is being dismantled and removed to the Cleveland yards. President Wallace said that because the freight rate on steel from Pittsburg to Bay City is $1.40 per ton higher than the rate from Pittsburg to Lake Erie ports, the Bay City plant can no longer be operated at a profit.

The final payment of 20 per cent on the recent $3,750,000 common stock issue of the Tennessee Coal, Iron & Railroad Co. was made June 15. It is stated that practically all of the new stock has been exchanged for bonds of the United States Steel Corporation.

PLANT OF THE ILLINOIS VALLEY SAND CO.

The Illinois Valley Sand Co. has recently built and placed in operation at its property some four miles west of Ottawa, Ill., on the Rock Island railroad, a plant for better preparing its silica sand for the market. The object of this plant is the sizing of the sand before it is shipped from the pits and the drying of the sand which carries, in a natural state, from 2 to 4 per cent of moisture. This drying not only avoids the freezing of the sand when winter shipments are attempted and thus makes it possible to ship at any time of the year but enables the company to supply the dry sand as well as green sand requirements of its customers at any time. The building of this installation cost in the neighborhood of $50,000.

The sand is found in bluff formations from 30 to 60 feet high, whose faces extend in an easterly and westerly direction, parallel with the main line of the Chicago, Rock Island & Pacific railroad and the Illinois-Michigan canal. From 6 to 10 feet of loam, clay, coal and shale lie on top of the sand and this is removed prior to excavating the sand. It is necessary to blast the sand from the bank and 40 per cent dynamite is used as the explosive agent in this work.

CRUSHER END OF PLANT, ILLINOIS VALLEY SAND CO.

VIEW OF ONE OF THE SAND BLUFFS, ILLINOIS VALLEY SAND CO.

In the old plant of the Illinois valley and all other plants producing the same character of sand in this district, the practice was followed of simply shooting down the sand, throwing out the larger lumps and loading the remainder into the cars. On account of this unsized condition of the sand on arrival at its destination, it was necessary for the users to put in crushing machinery of their own to get the material to a uniform size before it could be used. In winter, of course, all operations had to be suspended on account of the sand freezing in transit, and as a result, it was necessary for the users to accumulate a large stock in summer.

Beginning with the quarry, the sand when shot down from the bank is loaded into 4-yard side dumping cars by a 45-ton Bucyrus steam shovel. A 30-ton Brooks locomotive is used for moving the cars. At the plant the cars dump onto an inclined grizzly composed of pieces of railroad iron about 10 feet long, set 2½ inches apart. The undersized sand from the grizzly falls to a 30-inch belt conveyor which conveys it up and into the screening plant. The oversized is fed into a set of 30 x 36-inch spiked crushing rolls which break the material down to a maximum size of 1½ inches, their product dropping onto the above mentioned belt conveyor and being conducted to the screening plant. The conveyor discharges into a bin of 40 tons capacity, from which the material is fed by an automatic feeder to a 6 x 15-foot shaking screen which is provided with a woven wire covering for the 5/16-inch square openings between the wire. The oversized sand from this screen is elevated into a set of 30 x 10-inch smooth faced high speed rolls set directly over the screen, which rolls reduce the pieces that would not pass the screen, to a suitable size. This product is again returned to the

screen. The finished product, or material passing the screen falls on a 24-inch belt conveyor which conveys it to a steel storage tank 25 feet diameter and 45 feet high. From this tank the material can either be fed directly into railroad cars for shipment or can be diverted into the dryer room for drying. During the summer months it is not expected that any drying will be done except for special orders where dried sand is required.

VIEW OF PLANT OF THE ILLINOIS VALLEY SAND CO., SHOWING LARGE STORAGE BINS.

The drying of the sand is accomplished by means of two 54-inch x 40-foot revolving dryers of the same type as is used in cement plants and mining work. The product of these dryers is conveyed and raised into a second steel tank of the same dimensions as the tank for the storage of green sand and from this tank also the sand may be loaded directly into the railroad cars. The entire plant is automatic in its operation and no manual labor is required, excepting that for the attendance of the machinery, the feeding of the first crusher and the firing of the dryers.

The entire plant is electrically driven, three-phase, 60-cycle, 220-volt alternating current being employed, the different sections of the plant each being driven by its own motor, so that any section can be started or stopped without in any way interfering with the operation of the plant. The current is supplied from a central power house in which are located a 115-kilowatt alternating-current generator, driven by 14 x 14-inch high speed engine which is supplied with steam by a 72-inch x 18-foot return tubular boiler. From this same source the entire plant is lighted at night by arc lights at the principal points, with incandescents for individual cases.

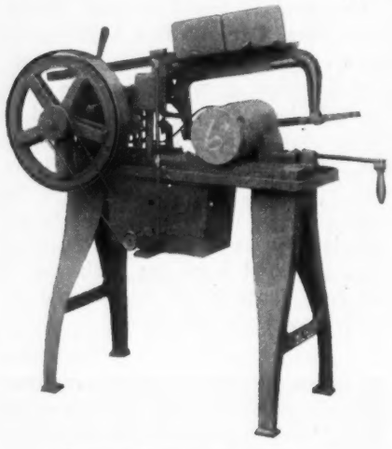
All of the buildings of the plant are of heavy timber construction and rest upon concrete foundations which in every case were carried down to hard pan. The capacity of the plant will be in excess of 1,000 tons in 24 hours, and by reason of the arrangement of the plant and installation of automatic machinery wherever practical, the plant can be operated with a minimum of labor resulting in a very low cost in production.

The sand in the deposits of this company analyzes 98 to 99 per cent silica, 0.3 to 0.5 per cent iron oxide and from 1 to 1½ per cent clay. The sand is in the form of a soft rock and the clay acts as a binder for the silica grains as may be clearly seen under a glass. The white or transparent color of the silica grains is somewhat modified by a yellowish tinge imparted by the iron ore. The crushing and drying plant was designed and erected by the J. C. Buckbee Co., engineers, Chicago. The sand company is now in a position to ship this high silica sand in a uniform, screened condition, either in the green state or dry at any time of the year and in any quantity.

A HIGH SPEED POWER HACK SAW.

The accompanying illustration shows a high speed automatic power hack saw built by the Racine Gas Engine & Power Co., Racine Junction, Wis. This machine has a cutting speed of not less than 60 feet per minute. It is equipped with the new automatic device for raising the blade on the return stroke, described in THE IRON TRADE REVIEW of Feb. 2, 1908. It is also equipped with a rotary pump for circulating cutting compound to the saw blade, the frame being made with a cast tray for collecting the compound into a tank under the machine. In this way it is used over and over again in a manner similar to screw machines.

The lifting of the blade on the return stroke is a feature of this machine on which the maker lays great stress. Tests have shown that as much as 80 pounds pressure has been applied on a saw blade 14 inches long, one inch wide and 0.032 inches thick without injury to the blade. During this test a 6-inch bar of round steel has been cut off in 32 minutes. By the use of cutting compound the speed of the machine can be increased by about 100 per cent and the time in cutting can also be decreased from 10 to 40 per cent, depending on the size and character of the material worked. Another feature of the machine is that it has a draw cut instead of a pushing cut. All bearings are extra long, those on the main shaft being 6¾ inches. The saw guide is cast in a single I-shaped piece 1 inch x 2¼ inches. The saw frame is also made in one casting with provisions for taking up wear and with a special device for holding blades from 10 to 14 inches long square with chuck.



RACINE POWER HACK SAW.

GRADING PIG IRON, FERRO-ALLOYS AND COKE

The following grading of pig iron, ferro-alloys and coke was prepared by Eliot A. Kebler, manager of sales of Matthew Addy & Co., Cincinnati, the foreign pig iron classification being furnished him by W. W. Hearne, the Philadelphia partner of the same company:

Standard Bessemer.

This iron is used principally for making acid Bessemer steel, this process burning out the impurities by blowing air through the molten Bessemer metal.

As neither this nor the acid open-hearth process removes any phosphorus it must be low.

The standard specification is as follows:

Silicon	1 to 2
Phosphorus	not over 0.10
Sulphur	not over 0.05

In the central section it is sold per ton, 2,268 pounds, if sand cast, or 2,240 pounds, if chill cast, except for special purposes where the sand iron is broken, in which case it may be sold per ton, 2,240 pounds, and a charge of 25 cents per ton may be added for breaking.

In the east and west (Chicago) it is always sold per ton, 2,240 pounds.

Malleable Bessemer or Malleable.

This is used for the manufacture of malleable castings. The usual specification is:

Phosphorus	not over 0.20
Sulphur	not over 0.05
Silicon as specified usually	0.75 to 1.25 or 1.25 to 1.75

Pigs are usually broken if sand cast, and both sand and chill cast are sold per ton, 2,240 pounds, except from a few furnaces in the central district which still sell some unbroken and also some broken malleable per ton, 2,268 pounds.

Low Phosphorus.

This is used for making acid steel extra low in phosphorus. The usual specification (sometimes called special low phosphorus) is:

Silicon	1 to 2
Phosphorus	not over 0.035
Sulphur	not over 0.035

For baby Bessemer converters, the silicon is desired as high as possible. It is sold per ton, 2,240 pounds.

Washed Metal.

This is Bessemer iron from which a large part of the phosphorus and sulphur and practically all the silicon and manganese have been removed from the molten metal by one of the pig washing processes. It is largely used in acid open-hearth furnaces for steel castings and fire box steel, and also in making crucible steel. It is sold by analysis, the four analyses recognized being:

Phosphorus	not over 0.010 per cent
Sulphur	not over 0.015 per cent
Phosphorus	not over 0.015 per cent
Sulphur	not over 0.020 per cent
Phosphorus	not over 0.020 per cent
Sulphur	not over 0.025 per cent
Phosphorus	not over 0.025 per cent
Sulphur	not over 0.030 per cent

It is cast on an iron plate, and comes in irregular pieces about 8 inches square. It is sold per ton, 2,240 pounds.

Basic.

This iron is used for making basic steel and can contain any phosphorus, as the basic flux and lining by combining with the phosphorus prevent it from entering the steel. As silicon attacks the lining and requires more flux, it is always specified under 1 per cent, and the basic pig is always sandless, that is, cast in chill molds. The sulphur is specified under 0.05. Basic iron is sold per ton, 2,240 pounds.

Iron Graded by Fracture.

This method of grading is being rapidly superseded by analysis grading.

No. 1 Foundry—Fracture contains large crystals.

No. 2 Foundry—This is considered the standard and contains medium size crystals, say ⅛-inch square, with no spot larger than 1-inch diameter without crystals, although pig can be close for ¼-inch along edges.

No. 3 Foundry—Contains small crystals; fracture is close.

East of Altoona, Pa., and throughout all of New York state these grades are: No. 1 X, No. 2 X, No. 2 Plain.

No. 1 is the highest price, the usual differential being 50 cents a ton.

Forge has a gray fracture with practically no crystals.

Mottled shows small white spots, giving the fracture a mottled appearance. Most of the carbon is in the combined state.

White shows a white fracture, and all carbon is in the combined state.

These last two grades are usually high in sulphur and low in silicon.

In the south iron which has a silvery fracture is graded as follows:

NO. 1 SOFT (sold same price as No. 1 foundry).

NO. 2 SOFT (sold same price as No. 2 foundry).

NO. 4 FOUNDRY (price is between No. 3 foundry and gray forge).

Foundry pigs cast in sand are always broken and all furnaces outside of a few of the central district irons are now sold per ton, 2,240 pounds. These few still sell 2,268 pounds to a ton, the extra 28 pounds being added to cover sand clinging to the pig.

Forge, Mottled and White iron may be unbroken or broken and is sold per ton, 2,240 pounds, with the exception of some central district irons which are sold per ton, 2,268 pounds.

All pig iron cast in chills is sold by analysis per ton, 2,240 pounds.

American Foundry and Forge Iron by Analysis.

A committee appointed by the blast furnace interests has made the following classification by analysis, and the tendency is to sell iron by analysis instead of fracture.

SOUTHERN POINTS.

	Silicon.	Sulphur.
No. 1 foundry	2.75 to 3.25	0.05 and under
No. 2 foundry	2.25 to 2.75	0.05 and under
No. 3 foundry	1.75 to 2.25	0.06 and under
No. 4 foundry	1.25 to 2.00	0.065 and under
Gray forge	1.25 to 1.75	0.07 and up
No. 1 soft	3.00 and over	0.05 and under
No. 2 soft	2.50 to 3.25	0.05 and under

EASTERN POINTS.

	Silicon.	Sulphur.
No. 1X	2.75 and up	0.03 and under
No. 2X fdry.	2.25 to 2.75	0.045 and under
No. 2 plain	1.75 to 2.25	0.05 and under
No. 3 foundry	1.25 to 1.75	0.065 and under
No. 2 mill	1.25 and under	0.065 and under
Gray forge	1.50 and under	0.065 and up

Note.—If sulphur is in excess of maximum, the iron is graded as lower grade, regardless of silicon.

CENTRAL WEST AND LAKE POINTS.

	Silicon.	Sulphur.
No. 1 foundry	2.25 to 2.75	0.05 and under
No. 2 foundry	1.75 to 2.25	0.05 and under
No. 3 foundry	1.75 and under	0.05 and under
Gray forge		0.05 and over

BUFFALO DISTRICT.

	Silicon.	Sulphur.
Scotch	3.00 and over	0.05 and under
No. 1 foundry	2.50 to 3.00	0.05 and under
No. 2 foundry	2.00 to 2.50	0.05 and under
No. 2 plain	1.50 to 2.00	0.05 and under
No. 3 foundry	1.50 (under)	0.05 and under
Gray forge		0.05 (over)

CHICAGO POINTS.

	Silicon.	Sulphur.
No. 1 foundry	2.25 to 2.50	0.02 to 0.05
No. 2 foundry	1.75 to 2.25	0.02 to 0.05
No. 3 foundry	1.35 to 1.75	0.06 and under
Scotch	2.50 to 3.00	0.05 and under
Silvery	3.00 to 3.50	0.05 and under
Gray forge		0.06 and over

Sampling.

The American Society for Testing Materials recommended the following method of sampling, which has been adopted by the American Foundrymen's Association:

In all contracts where pig iron is sold by chemical analysis each carload or its equivalent shall be considered as a unit. At least one pig shall be selected at random from each four tons of every carload, and so as to fairly represent it.

Drillings shall be taken so as to fairly represent the fracture surface of each pig, and the sample analyzed shall consist of an equal quantity of

drillings from each pig, well mixed and ground before analysis.

In case of disagreement between buyer and seller an independent analyst, to be mutually agreed upon, shall be engaged to sample and analyze the iron. In this event each pig shall be taken to represent every two tons.

The cost of this sampling and analysis shall be borne by the buyer if the shipment is proved up to specifications and by the seller if otherwise.

Note.—No. 2 foundry and No. 2X foundry are the standards and No. 2 soft sells at the same price. No. 1 foundry or No. 1 soft sells usually 50c higher and "silvery" still higher, depending on silicon contents. The other grades decrease about 50c a grade.

"Scotch" indicates a more fluid iron, usually higher in phosphorus and silicon than the ordinary furnace run.

In selling by analysis the tendency is to do away with the numbers and merely give the limits in silicon and sulphur.

High Silicon Irons.

Softeners are sold by silicon contents and run from 6 to 10 per cent silicon, the price increasing about 50 cents per unit of silicon.

Silvery irons run from about 3½ to 5½ per cent of silicon. This last class is sometimes divided into No. 1 Silvery, which is the higher silicon, and No. 2 Silvery, the lower.

The still higher silicon irons are shown under ferro-alloys.

In addition to this, there is a special high silicon, usually 50 per cent silicon, although it is sometimes sold as high as 75 per cent silicon, made in an electric furnace.

Ferro-Manganese—This is ordinarily sold with a guarantee of 80 per cent manganese, this being the only element which is guaranteed.

Owing to the lower phosphorus in English cokes, the English ferro-manganese ordinarily runs a little lower in phosphorus than that made in Germany.

Foreign Iron.

All pig iron is sold in England per ton, 2,240 pounds and in France and Germany per 1,000 kilos.

In England and Europe generally iron is not called Bessemer, as both acid and basic Bessemer converters are used.

Hematite.

Silicon	about 2.50
Sulphur	usually about 0.035
Phosphorus	usually 0.035
	it seldom running over 0.06

West Coast Hematite shows manganese under 0.50; East Coast Hematite has manganese over 0.75.

Thomas Gilchrist, or Thomas Pig Iron.

This is used in basic Bessemer converters and usually analyzes about:

Silicon	0.50
Phosphorus	2.50
Manganese	2.50
Sulphur up to	0.20

Open-Hearth Basic.

There is practically no open-hearth basic in Europe or England. At Middlesboro the Bells are making open-hearth basic, but their pig analyzes:

Silicon	0.75 to 1.50
Phosphorus	1.00 to 1.75
Sulphur	up to 0.20

They use a mixer and a desulphurizing bath.

English Foundry Iron.

This is graded by fracture and no analysis is guaranteed. The rules for standard foundry pig iron issued by the London Metal Exchange are as follows, and it will be noted that instead of grading by silicon contents, as in this country, sulphur seems to be the ruling element.

	Silicon.	Phosphorus. Not over.	Sulphur. Not over.
No. 1, 2½	to 3½	1.00	0.04
No. 2, 2½	to 3½	1.25	0.05
No. 3, 1	Not over 3½	1.65	0.08
No. 4, 1	Not over 3	1.75	0.10

The ordinary English Pig Irons can be divided into two groups, with

Manganese	under 0.75
and Manganese	say 0.75 to 1.10

The brand and grade mostly imported into this country is:

Middlesboro No. 3. Analysis unguaranteed, but usually shows:

Phosphorus	1.40 to 1.50
Manganese	0.40 to 0.75
Silicon	usually high, say 2.50
Sulphur	0.02 to 0.05

The No. 1 has practically the same analysis except that the sulphur is extremely low.

All Mine Pig Iron. Analysis about as follows:

Phosphorus	0.20 to 0.70
Sulphur	0.06 to 0.20
Manganese	under 0.75

The Scotch Pig Iron is also sold by fracture, a typical analysis of No. 3 being

Phosphorus	0.60 to 1.15
Manganese	1.10 to 1.80
Sulphur	about 0.03
Silicon	about 2 to 2.50

American Charcoal Irons.

These irons are divided into two classes:

Cold Blast, which is made in small furnaces with a capacity of about 4 to 8 tons a day blown with unheated air.

Warm Blast, in which the blast is heated from 500 to 900 degrees Fahr.

Cold Blast Iron.

This iron is used principally for making chilled rolls and is graded as follows outside of the Lake Superior region:

No. 1, highest silicon, lowest sulphur iron with a fracture like a No. 3 coke iron.

No. 2 has a fracture like a forge and will chill ⅛-inch when cast against an iron plate.

No. 3 shows ¼-inch chill.

No. 4 a ⅜-inch to ¾-inch chill.

No. 5 a ¾-inch to 1½-inch chill, the face of the pig being strongly mottled.

No. 6 is white, all of the carbon being in a combined state.

Warm Blast Iron.

This iron is used principally for car wheel work, for strengthening general machinery castings, and making rolls.

Outside of the Lake Superior region it is graded as follows:

No. 1 highest silicon, lowest sulphur iron, with a fracture like a No. 2 coke iron.

No. 2 has a fracture like a No. 3 coke iron.

No. 3 has a fracture similar to forge.

No. 4 will show a chill of about a quarter of an inch if cast against an iron plate.

No. 5, a chill of about ¼-inch to ¾-inch.

No. 6 will show a chill of about ¾ to 1½-inch and is mottled when cast in sand.

No. 7 has a white fracture. Carbon is all combined.

The Lake Superior charcoal irons are graded, not by fracture, but by analysis, the following classifications being most generally used:

	Silicon. Ave'ge.	Min.	Max.	Chill.
A Scotch	2.50	2.38	2.62	
B Scotch	2.25	2.13	2.37	
C Scotch	2.00	1.88	2.12	
Low 1	1.75	1.63	1.87	
High 1	1.50	1.38	1.62	
Low 2	1.25	1.13	1.37	
High 2	1.00	.88	1.12	
Low 3	.75	.63	.87	Trace to ¼ in.
High 3	.56	.50	.62	¼ to ⅝ in.
Low 4	.44	.38	.50	⅝ to 1 in.
High 4	.32	.25	.38	1 to 1½ in.
Low 5	.20	.15	.25	Low Mottled
High 5	.10	.05	.15	White Mottled
No. 6	.00	.00	.05	White

Phosphorus	0.15 to 0.22
Manganese	0.30 to 0.70
Sulphur	Trace to 0.018

Coke.

This is divided into the following classes:

Foundry—This coke is selected from ovens which have burned 72 hours. It is always made on Mondays and Tuesdays, as no work is done at the ovens on Sunday. It may be made on other days of the week by shutting down another day. It is hard and large and has a bright appearance, caused by the carbon condensing or fusing on the surface. This coke is used in cupolas for melting iron and for heavy forging work.

Furnace—This is coke that is burned 48 hours and is used in smelting ores in blast furnaces. It is sometimes used in cupola practice.

Standard Foundry and Furnace Coke—Sulphur under 1 per cent, the lower the better. Ash not over 13.00 per cent; quality improves with the reduction in ash, until percentage is reduced to a point where structure is weakened.

Smelter coke is either of the above

running, say over 1.20 per cent in sulphur. While this higher sulphur renders it undesirable for smelting or melting iron, it does not harm in the smelting of most other ores.

Stock—This coke is stocked on the oven yard, instead of being loaded direct into the car. If care is used in selecting this coke when loading, it is as good as if freshly drawn, with the exception that it is somewhat broken up by the double handling and is discolored.

Soft, Heating or Jamb—This coke is the cullings from the above classes and is made up of the backs, fronts and coke around the oven doors. This is often incorrectly called stock coke.

Crushed Coke—This is crushed and graded according to size into the following classes:

Egg, large stove, small stove, chestnut, 7/8-inch pea, 1/2-inch pea, dust.

The first four grades are used for house heating, small forgings, etc., the pea coke for chemical works, etc., and the dust for packing the bottoms of soaking pits and crucible furnaces.

Ferro-Alloys.

Owing to the fact that many of the ferro-alloys have only been in use for a comparatively short time, the fixed standards have not in many cases been adopted. One company designates its material by showing the number of units of carbon by "X" and the kind of alloy by its letter symbol, thus a ferro-chrome containing 9.70 carbon, it would designate 9 x C.

All foreign ferro-alloys are sold to the American consumers f. o. b. cars American seaboard, based on present duties, United States custom house weights at seaboard to govern settlement, and upon certificate of foreign chemist of repute to be conclusive as to quality.

Ferro-Aluminum is sold containing 10 per cent aluminum. Higher percentages are also used in iron and steel, No. 1 being guaranteed over 99 per cent pure aluminum. No. 2 is guaranteed over 90 per cent aluminum, with no injurious impurities for alloying with iron and steel. It is sold by the pound.

S. A. M. Alloy. This is an alloy of silicon, aluminum, manganese and iron. One partial analysis showed:

Silicon	8.01
Aluminum	6.80
Manganese	8.39
Phosphorus	0.075

Ferro-Chrome usually runs 60 per cent to 68 per cent chromium. It is graded per unit of chromium and per unit of carbon, the price increasing with the chromium and decreasing with the increase in carbon, these elements being guaranteed. If low in carbon, it is sometimes called "mild."

A typical analysis only guaranteed as above is as follows:

	Mild	Ordinary
Chromium	64.80	66.00
Iron	33.43	21.91
Carbon	1.21	9.90
Silicon	0.29	1.40
Phosphorus	0.027	0.07
Sulphur	0.02	0.22
Manganese	0.09	0.20
Copper	0.12	....
Aluminum	....	....

It is sold per ton, 2,240 pounds.

Ferro-Manganese contains over 40 per cent manganese.

Standard Ferro-Manganese is only guaranteed to average 80 per cent or over manganese. The English runs lower in phosphorus than that from the continent. A typical analysis, manganese only guaranteed, is as follows:

	English.
Manganese	80.50
Iron by dif.	11.50
Silicon	1.65
Phosphorus	0.23
Carbon	6.78
Sulphur	....

It is sold per ton, 2,240 pounds.

Ferro-Molybdenum is sold per pound of pure molybdenum contained, regardless of the percentage of other material. Thus, if a pound of 80 per cent ferro molybdenum is purchased, 1¼ pounds of the alloy will be received. A typical analysis, the units of molybdenum only guaranteed is as follows:

Molybdenum	79.15
Iron	17.55
Carbon	3.24
Phosphorus	0.028
Sulphur	0.021

Nickel. As ordinarily used in steel this is guaranteed over 99 per cent nickel and is sold by the pound.

Ferro-Nickel is also supplied with 25, 35, 50 or 75 per cent of nickel as specified. The balance of analysis outside of the nickel and iron run about:

Carbon	0.85
Silicon	0.25
Sulphur	0.015
Phosphorus	0.025

Ferro-Phosphorus contains over 10 per ecnt phosphorus. The foreign is guaranteed 22 to 24 per cent phosphorus.

A typical analysis of foreign, the phosphorus alone being guaranteed, is as follows:

Phosphorus	21.40
Iron	75.03
Manganese	0.70
Silicon	1.63
Carbon	1.17

The domestic is guaranteed:

Phosphorus	18 to 22 per cent
Sulphur	under 0.05
Manganese	under 0.50

It is sold per ton, 2,240 pounds.

Phospho - Manganese. A typical analysis is:

Manganese	65 00
Phosphorus	25.00
Iron	7.00
Carbon	2.00
Silicon	1.00

Silico-Spiegel contains manganese 17 to 22 per cent and silicon 6 to 12 per cent. The standard is guaranteed as follows:

Manganese	18 to 20 per cent
Silicon, 9 to 11 per cent.	average 10 per cent

A typical analysis, nothing but manganese and silicon guaranteed, is as follows:

Manganese	20.32
Iron by dif.	68.02
Silicon	10.33
Carbon	1.26
Phosphorus	0.07
Sulphur	....

It is sold per ton, 2,240 pounds.

Special High Silicon contains over 40 per cent silicon. It is guaranteed 50 per cent silicon with an allowance of $1.75 per unit either way. The other elements are not guaranteed. A typical analysis is:

Silicon	49.90
Manganese	0.16
Carbon	0.55
Phosphorus	0.075
Sulphur	0.018

It is also guaranteed 75 per cent silicon with an allowance of $2.50 per unit either way. It is sold per ton, 2,2440 pounds.

Bessemer Ferro-Silicon. This runs 8 to 16 per cent in silicon, the price usually increasing or decreasing $1 per unit.

The "Domestic" is guaranteed silicon as specified 8 to 16 per cent.

Phosphorus	not over 0.10
Sulphur	not over 0.05

The "Foreign" is unguaranteed, but phosphorus and sulphur while unguaranteed, run very low. It is sold per ton, 2,240 pounds. For lower percentages of silicon see "High Silicon Irons."

Ferro-Sodium is usually sold with 25 per cent metallic sodium and free from lime or excess of carbon.

Spiegel, Spiegel-Eisen or Mirror Iron contains 10 to 40 per cent of manganese. The standard is guaranteed:

Manganese	18 to 22 per cent. average 20 per cent
Phosphorus	0.10 or under

The silicon limits are sometimes specified, as it is desirable to know how same will run. A typical analysis only guaranteed as above, is as follows:

Manganese	20.50
Iron	73.61
Silicon	0.76
Carbon	5.18
Sulphur	0.002
Phosphorus	0.055

It is sold per ton, 2,240 pounds.

Ferro-Titanium. The lower titanium contents is sold guaranteed only in titanium, which is 10 to 12 per cent, and is sold by the pound of alloy.

A typical analysis:

Titanium	11.21
Iron by dif.	87.68
Carbon	0.67
Silicon	0.37
Phosphorus	0.04
Sulphur	0.03

If higher in titanium, it is sold per pound of pure titanium contained, re-

gardless of the percentage of other material, the titanium above being specified. A typical analysis is as follows:

Titanium	51.30
Iron	44.18
Carbon	2.82
Manganese	0.08
Arsenic	1.12
Sulphur	0.047
Phosphorus	0.021
Aluminum	0.41

Ferro-Tungsten is sold per pound per unit of tungsten contained, the price increasing with the increase in tungsten and decreasing with the increase in carbon. A typical analysis, the tungsten and carbon only being guaranteed, is as follows:

Tungsten	85.47	61.20
Iron	13.90	33.02
Carbon	0.30	2.97
Silicon	0.13	0.47
Manganese	0.09	1.88
Aluminum	0.00	0.31
Phosphorus	0.019	0.03
Sulphur	0.025	0.03

Ferro-Vanadium is sold per pound at price per unit of vanadium contained, that is, if alloy contains 20 per cent vanadium and selling price is five cents per unit, it would cost $1 per pound of alloy. A typical analysis as made by one foreign company, vanadium alone being guaranteed, is as follows:

Vanadium	36.0
Manganese	0.6
Iron	61.0
Carbon	0.4
Silicon	0.9
Aluminum	0.8

AN UNUSUALLY LARGE ROPE SHEAVE AND CUT GEARS.

The accompanying illustrations show a rope sheave of unusual dimensions and a cut gear and pinion recently completed by H. W. Caldwell & Son Co., Chicago, Ill. The sheave is 20 feet diameter, has 20 grooves for 2-inch rope and weighs finished 48,000 pounds. It will be noticed from the illustration that the sheave has a double set of arms. The sheave was cast in one piece and split for convenience in handling and erecting. It was cast in the foundry of the Caldwell Co. and finished on 20-foot boring mill, as indicated by the illustration. It is intended for use in connection with the main drive in a refrigerating plant located in Mexico, the large sheave receiving power from an electric motor, the transmission being by means of what is generally known as the American or single rope system.

The gears are of a semi-steel mixture and the weight of the large gear is 13,200 pounds and of the small gear 8,100 pounds. The pitch diameter of the large gear is 95.51 inches and of the pinion 55.41 inches. The face is 27 inches, and the pitch 3 inches. The gears were cast in halves and the joints planed. The dimensions of the gears are unusual on account of the small pitch as compared with the wide face. The teeth were machined in a large gear planer, it being considered preferable to plane the teeth rather than mill them on account of the extraordinary dimensions of the gears. The gears are to be used in connection with the drive of a mining hoist in the Lake Superior copper mines.

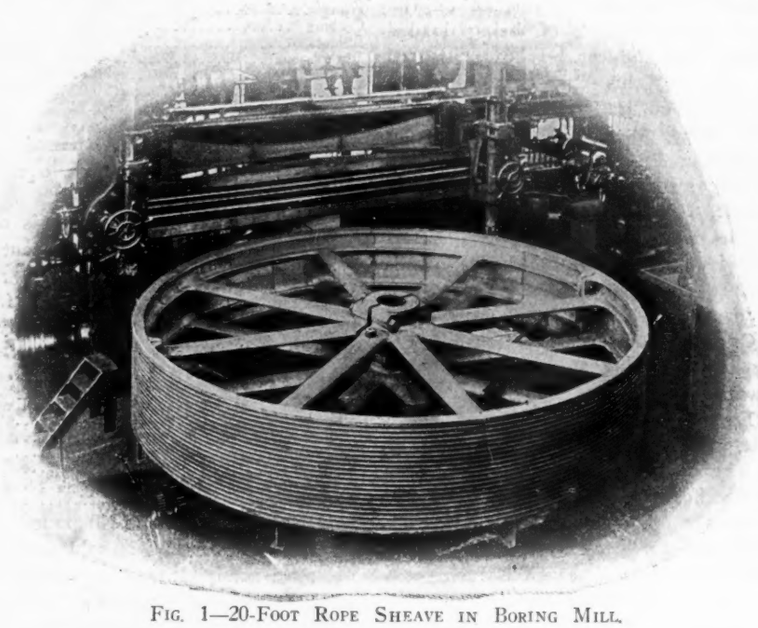


FIG. 1—20-FOOT ROPE SHEAVE IN BORING MILL.

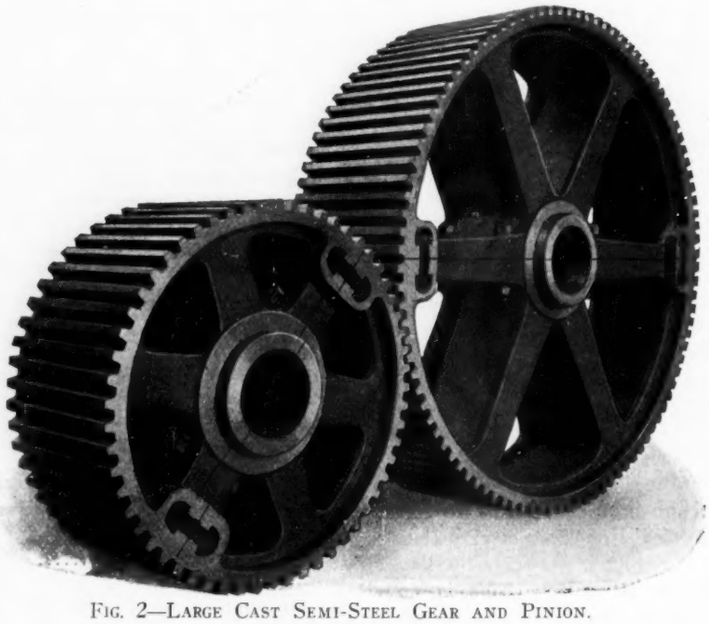


FIG. 2—LARGE CAST SEMI-STEEL GEAR AND PINION.

Milwaukee Engineers' Election.—At the recent annual meeting the following officers were elected by the Engineers' Society of Milwaukee: President, E. P. Worden; vice president, T. S. Watson; secretary, W. F. Martin; treasurer, M. A. Beck; directors for three years, L. L. Tatum, H. Weickel and Paul Johnson. A feature of the meeting was a talk on "Excavating Machinery" by President Knox, also vice president and general manager of the Bucyrus company.

The Nova Scotia Steel & Coal Co., it is announced, will shortly close its blast and open-hearth furnaces for an indefinite period, on account of want of orders.

Market Halts on Politics

Awaiting the results of the Republican national convention at Chicago occupied the attention of the stock market last week to the practical exclusion of everything else. Now the market has settled down to another period of waiting for the results of the Democratic national convention in Denver, July 7. Prices opened weak Monday last week, but recovered and closed steady, rising a trifle Tuesday. Wednesday the market was inactive and closed weak. Following the suspension of the quarterly preferred dividend by the Republic Iron & Steel Co. and a dividend reduction on a leading railroad stock, the market became dull. Friday's market turned weak, and closed lower on rumors of an alleged possible open market for some classes of iron and steel. Extreme dullness characterized Saturday's market, but prices held fairly firm.

Gold to the amount of $600,000 was engaged Monday for export to Berlin and on Wednesday $3,250,000 additional was engaged for export. Money rates were practically unchanged for the week. The Berlin banking rate was reduced to 4 per cent. New York banks experienced great difficulty in making loans. Two large banks in that city returned their public deposits to the government because of the imposition of the 1 per cent interest charge. There was a moderate demand for time money. New York experts profess to expect the usual midsummer dullness in July and August.

Business failures for the week ending June 18 numbered 254, compared with 253 last week, and 165 in the corresponding week of 1907.

The weekly bank statement of the New York banks was better than expectations, the cash gain exceeding $13,000,000, despite an expansion of $26,055,500 in loans. The addition to the surplus reserve was $5,320,575, the total surplus now standing at $63,525,300, compared with a surplus of $5.626,600 this time a year ago, and a surplus of $10,912,925 two years ago. The gain in cash from the interior continued large. The clearing house banks showed an actual reserve of 30.0 per cent, compared with 29.8 last week; state banks, a percentage of reserve of 30.7 per cent. The number of shares dealt in during the week was 1,696,422, compared with 1,618,815 last week, and 1,222,910 the corresponding week last year. Bonds, exclusive of government bonds, aggregated $15,407,000, compared with $11,645,000 last week, and $3,682,000 the corresponding week last year.

THE LEADING INDUSTRIAL SECURITIES.

	Closing Quo. June 20	Changes in Week	Date 1908 Ann. M't'g	Stock Outstanding	Dividend Basis	Dividend Last Declared	Dividend Date Last Div. Pay.
Allis-Chalmers	11⅛	+1⅛	Sept. 3	19,820 000			
Allis-Chalmers pr	33	+8⅛		16.150,000	7 cum	1¾ Q.	Feb., 1904
American Can	4⅝	− ¼	Feb. 3	41.233.300			
Am. Can pr	55¾	− ¾		41,233,300	7 cum	1¾ Q.	July, 1908
Am. Car & Foundry	84	.....	June 25	30,000,000		½ Q.	July, 1903
Am. Car & Fdy. pr	96	−2½		30.000.000	7 n. c.	1¾ Q.	July, 1908
American Loc	43½	−5¼	Oct. 20	25,000,000	5	1¼ Q.	May, 1904
American Loc. pr	101	−1		25,000,000	7 cum	1¾ Q.	April, 1908
American Ship	42	− ½	Oct. 14	7 60 ,000	4	1 Q.	June, 1908
American Ship pr	100½	.....		7,900,000	7 n. c	1¾ Q.	April, 1908
Am. Steel Foundries	7	+ ⅛	Oct. 6	15.810 000			
Am. Steel Foundries pr	37¾	+2¾		17,240,000	6 cum	2½	Aug., 1904
Barney & Smith	80	.....	June 2	2.000,000	4	1 Q.	Sept., 1907
Barney & Smith pr	100	−5		2.500 000	8 cum	2 Q.	June, 1908
Bethlehem Steel	13¼	−2½	April 7	14.862,000			
Bethlehem Steel pr	43¾	+ ¼		14 908.000	7 n. c.	¾ Q.	Feb., 1907
Cambria Steel	31	+ ⅝	March 17	45,000,000*	6	1½ S. A.	Feb., 1908
Cambria Iron	44	−1⅝		8,168.000*	4	2 S. A.	April, 1908
Chicago Pneumatic Tool	25¾	+2¾	Feb. 17	6,145,800	4	1 Q.	Oct., 1907
Colorado Fuel	26¼	+ ⅛	Oct. 19	34 235 500		3½	April, 1902
Crucible Steel	5⅞	+ ⅛	Oct. 21	24.578 400			
Crucible Steel pr	42⅛	− ⅝		24,436.500	7 cum	1 Q.	Dec., 1907
Empire Steel	8	.....	Feb. 26	1,254.770			
Empire Steel pr	48	+3		2 500,000	6 cum	3 S. A.	July, 1907
Fay & Egan	100	.....	Feb. 18	1.000.000	6	1¾ Q.	May, 1908
Fay & Egan pr	110	.....		1,000 000	7 cum	1¾ Q.	May, 1908
General Electric	133⅞	− ⅛	May 12	65,167.400	8	2 Q.	July, 1908
Harbison-Walker	18	+2	Jan. 20	18.000.000		½	Oct., 1907
Harbison-Walker pr	68	+1		9.6 0,000	6 cum	1½ Q.	April, 1908
International Pump	23	.....	June 2	17.787.300		1	April, 1905
International Pump pr	76	+1		13,835,000	6 cum	1½ Q.	May, 1908
Lackawanna Steel	34	.....	March 11	34,971 400			
Lake Sup. Corp	5¼	+ ¼	Oct. 7	40,000,000			
New York Air Brake	65	.....	June 18	8.012,500	8	2 Q.	Oct., 1907
Niles-Bement-Pond	130	.....	Feb. 5	8,500 000	6	1½ Q.	June, 1908
Niles-Bement-Pond pr	100	.....		2.000,000	6 cum	1½ Q.	May, 1908
Otis Elevator Co	34	−1	March 16	6.156,600		1½ S. A.	April, 1908
Otis Elevator Co. pr	88	.....		5 449,500	6 n. c.	1½ Q.	July, 1908
Penn. Steel	60	.....	May 11	10,720 000			
Penn. Steel pr	96	.....		16,5 0 400	7 n. c.	3½ S. A.	May, 1908
Pittsburg Coal Co	12	−1	Feb. 10	28,853.400			Nov., 1906
Pittsburg Coal Co. pr	42¼	− ¾		27,080,800	7 c.	1¾	April, 1905
Pressed Steel Car	26¾	.....	Feb. 19	12,500,000		3	Aug., 1904
Pressed Steel Car pr	83	.....		12.500,000	7 n. c.	1¾ Q.	May, 1908
Pullman	158½	+ ⅝	Nov. 11	100 000,000	8	2 Q.	May, 1908
Railway Stl. Spring	37	.....	March 5	13,500,000	4	2 S. A.	April, 1908
Railway Stl. Spring pr	95	+1		13,500,000	7 cum	1¾ Q.	June, 1908
Rep. Iron & Steel	17	−1	Oct. 21	27,191.000			
Rep. Iron & Steel pr	63¼	−2½		20,416,900	7 cum	1¾ Q.	April, 1908
Sloss-Sheffield	49¾	− ¾	March 11	10,000,000	5	1 Q.	June, 1908
Sloss-Sheffield pr	96	.....		6,700,000	7 n. c.	1¾ Q.	July, 1908
U. S. Pipe & Fdy	26¾	− ¾	June 24	12,500,000	4	1 Q.	Dec., 1907
U. S. Pipe & Fdy pr	73¾	.....		12 500,000	7 n. c	1¾ Q.	June, 1908
U. S. Steel	37⅝	+ ⅜	April 20	503,302,500	2 n. c.	½ Q.	June, 1908
U. S. Steel pr	101¾	.....		360,281,100	7 cum	1¾ Q.	June, 1908
U. S. Steel 5's	96⅝	.....		463,798,000	5	5 A.	.....
Va. Iron. Coal & Coke	52⅛	.....	Nov. 17	9,073 680			
WestinghouseElec	50	+4⅛	June 24	23 933.200*	10	2½ Q.	Oct., 1907
WestinghouseAir Brake	96	−2	Oct. 6	11,000,000*		2½ Q.	July, 1908

Par value of shares, $100, except those starred (*), $50

Copper Market.

New York.—Amalgamated Copper closed 67⅝, a net gain of ⅜.

Boston.—Butte Coalition closed 23, a net loss of ⅛; Calumet & Hecla closed 668, a net loss of 7; Calumet & Arizona closed 108, no change; Quincy Mining closed 84½, no change, North Butte Mining closed 67, a net gain of ¾.

The Manning, Maxwell & Moore Co. declared the regular quarterly dividend of 1½ per cent, payable July 1; the De Long Hook & Eye Co., quarterly dividend of 1½ per cent, payable July 1; the Union Switch & Signal Co., the regular quarterly dividend of 3 per cent on both common and preferred, payable July 10; the Garvin Machine Co., the regular semi-annual dividend of 3½ per cent on preferred, payable July 1; the Central Iron & Coal Co., declared the regular quarterly dividend of 1¼ per cent on preferred and 1½ per cent on the common, payable July 15; the National Carbon Co., the regular quarterly dividend of 1¾ per cent payable July 1; the Yale & Towne Mfg. Co., quarterly dividend of 1½ per cent, and one-half of 1 per cent extra, payable July 1.

NEWS FROM MANY INDUSTRIES

New Buyers:—

The Delaware Steel Co., with a capital of $135,000, has these incorporators: F. M. Shive, S. E. Robertson and Harry W. Davis, Wilmington, Del.

P. F. King, P. A. King, H. H. King, J. A. Lannert and M. Lannert have incorporated the Lannert-King Co., Cleveland, foundry, with $100,000 capital.

A charter has been granted to the Wausau Iron Works, Wausau, Wis., capitalized at $25,000. The incorporators are A. C. Heinzen, Henry Ellenbecker and Fred W. Krause.

The Atlas Construction & Engineering Co., Reading, Pa., with a capital of $5,000, has been incorporated by L. E. Gaenzle, John Gaenzle and George A. Hull, Reading.

The New Western Foundry Co., Kansas City, Mo., has filed articles of incorporation through W. H. Sanford, W. A. Sanford and E. M. Miller. The capital stock of the company is placed at $20,000.

J. W. Feeter, Inc., Highland, N. Y.; to manufacture hardware and hardware supplies, with a capital of $15,000, has these incorporators: James W. Feeter, William Feeter and Daniel H. Kurtz, Highland, N. Y.

Articles of incorporation have been filed by the Railroad Safety Signal Co., Wilmington, Del., capitalized at $300,000. Richard J. Ryan, J. G. Gray, M. B. F. Hawkins, Wilmington, Del., are the incorporators.

The Wiltshire Boehm Mfg. Co., 145 LaSalle street, Chicago, has been chartered to manufacture metal specialties, with a capital of $10,000. The incorporators are: Charles Wiltshire, George P. Boehm and George H. Wiltshire.

Edward D. Cronan, G. Q. Dean and Fred Knowlton, of New York City, are the incorporators of John Sloan & Co., Inc., which will manufacture and develop iron, steel and copper properties. The capital stock is $100,000.

The Mohawk Machine Shop, Fonda, N. Y., to manufacture self-propelling vehicles, motors, engines, etc., with a capital of $5,100, has been granted a charter. Those interested are: Elmer E. Folmsbee, Tunis P. Bowler and William J. Smith, Fonda, N. Y.

Hancock Bros., 1350 First National Bank building, Chicago, has been incorporated to manufacture and install engines and machinery. The company is capitalized at $5,000, and the incorporators include Gale Block, Arthur J. Donovan and Arthur A. Anderson.

The Griffith Iron Mining Co., to do a general mining business, has incorporated at St. Louis. The capital stock, 50 per cent paid, is $6,000, and the incorporators are: W. B. Cowen, N. B. Fauntleroy, of St. Louis, and B. M. Griffith, of Steelville, Mo.

Articles of incorporation have been filed by the Folding Steel Ladder Co., New York City, to manufacture folding steel ladders, fire escapes, etc., with a capital of $50,000. The incorporators are Bernard B. Neal and Harry F. Stoffregen, 81 Warren street, and Myron A. Kesner, 2 West 112th street, all of New York.

The Ideal Steam Turbine Co., New York City, has been granted a charter to engage in the manufacture of steam turbines, engines, boilers, etc., with a capital of $100,000. Those interested are Francis S. Palmiero, Alfred Bonom, 45 West Thirty-fourth street, and Augustus M. Brown, 131 West Seventy-eighth street, New York City.

The Stave Electrical Co., New York, has filed articles of incorporation to manufacture electrical and mechanical machinery and appliances, with a capital of $100,000. The incorporators are: Theodore Stave, 10 West Thirty-ninth street; Alexander Watson, 10 West Thirty-ninth street, both of New York; and Richard H. Smith, 554 East 141st street, the Bronx.

The Vacuum Cotton Picking Machine Co., St. Louis, Mo., has been granted a charter to manufacture and deal in cotton picking machinery, with a capital stock, fully paid, of $750,000. The incorporators are: John S. Thurman, C. V. Thurman, W. W. Conklin, F. A. Coolidge, J. A. Dunlap and C. F. L. Hoffinger, all of St. Louis, and R. S. Hallett, of New York City.

The Thomas Brace Rail Co., New York, to manufacture railroad rails and appliances, build railroads, mining, etc., with a capital of $2,000,000, has been chartered by E. T. Thomas, 115 Broadway; John Oehler, 87 Frankfort street, both of New York; Wl A. Campbell, 247 New York avenue; T. H. Ross, 27 Madison street; C. B. Schellenberg, 220 Duffield street, all of Brooklyn.

The Eton Talc Mining Co., Atlantic City, to mine talc, barytes, barite and other ores and minerals, with a capital of $10,000, has been incorporated by Jesse B. Thompson, Daniel W. Meyers, Jacob O. Meyers, 9202 Pacific avenue, and Samuel H. Kelly, 3205 Pacific avenue, all of Atlantic City, N. J.

C. S. Chenault, W. C. Bullman and G. M. Thompson have incorporated the New Decatur Machine Co., New Decatur, Ala., with $21,000 capital stock.

S. B. Eddy, 31 Nassau street, New York City, is one of the incorporators of the New Jersey Steel Construction Co., which has been formed under New Jersey laws with a capitalization of $200,000 to construct bridges and steel buildings. Details of its plans are not yet ready for publication.

The Pierce Safety Appliance Co., Wheeling, W. Va., has been incorporated with a capital stock of $500,000 by Franklin A. Pierce, Earl A. Lenkard, Wheeling; John E. Oswald, John T. Travers, Bellaire, and Wm. McSwain, Moundsville. The company will manufacture and sell railway devices, appliances and signal systems.

New Construction:—

The contract has been let for the construction at Owosso, Mich., of the plant of the Independent Stove Works, to the Wood Construction Co.

Architect P. T. Benton, of Green Bay, Wis., is receiving bids for the construction of a one-story machine shop to be built for the Strauble Machine Co., Green Bay.

The machinery of the Nowata Machine Works, Mason City, Ill., of which Messimer & Vandivort are proprietors, was placed in operation a few days ago in their new building.

The McGeorge Engineering Co., Cleveland, is receiving bids for the new building for the Peerless Motor Car Co., Cleveland. The building will be of brick and steel construction, 106 x 140 feet.

The Union Embossing Machine Co., Anderson, Ind., has let the contract for the first of the new factories to John Clifton & Son, Indianapolis, Ind. The company will erect three buildings on the factory site of nine acres, one 65 x 400 feet, one 30 x 210 feet, and a two-story office building 30 x 50 feet.

The Progressive Stove & Furnace Works, Colorado Springs, Colo., is about completing the new store room, 40 x 70 feet. The addition to the foundry room, 40 x 50 feet, will be

begun at once. A Cunningham brass furnace will be installed. Orders for a satisfactory quantity of brass castings are being steadily received.

The Pioneer Steel Co., Rockford, Ill., has just installed in its shops a blanking machine, weighing 20 tons, and a shear weighing 40 tons. The shops of the Pioneer company are now equipped with first class facilities for the production of soft center steel in all desired shapes, and orders are on hand about equal to the present furnace capacity.

The Occidental Metal Mfg. Co., offices at Kansas City, Mo., has leased 213 acres at Eureka, St. Louis county, Mo., and is surveying the plat with a view to establishing a manufacturing plant for brass goods. Cheaper freight rates, especially in the carload delivery of coal, is given by the company as the reason for its location near St. Louis.

The Ball Engine Co., Erie, Pa., is building an addition to its machine shop 60 x 120 feet, to accommodate an additional number of small engines. The growing demand for Ball engines has caused this increase. The plant is now running full time and with full force, and a considerable amount of business is booked for the future. Neither the Burke Electric Co. nor the Ball Engine Co.'s shops were damaged by the fire at the plant of the Erie Foundry Co.

The Southern Wisconsin Foundry Co., Madison, Wis., advises that plans are being drawn for a foundry building 60 x 160 feet, with extensions for core rooms, cupola, cleaning room, engine room, etc., about 30 x 80 feet, as well as a pattern shop 25 x 50 feet. In the new plant will be installed two cupolas, and two cranes will be used in handling gray iron castings, 10 to 12 tons, as well as brass castings. The company will add another gas engine, and will install an electric generator to run its own light plant. When completed in September, the plant will be modern in every respect. It has ample room for further growth. The capital stock of $25,000, is fully paid in, and the company has the following officers: President, George C. Riley. vice president and superintendent, Henry A. Knabe; and secretary and treasurer, H. M. Vance.

The Sioux City Iron Co., Sioux City, Ia., has let the contract for rebuilding a five-story warehouse 150 x 150 feet, to replace a burned structure.

The Bonnett Nance Stove Co., Chicago Heights, Ill., is having plans prepared for an addition to its manufacturing plant, to cost $40,000. It will be two-story, 100 x 200 feet, concrete foundation, brick and steel construction.

The plant of the Foster Bedell Implement Works, East Chattanooga, Tenn., is being enlarged by the erection of a brass foundry larger than the present building. This structure is also being remodeled and equipped with new machinery.

The Minetto Meriden Co., New York City, is having plans prepared for a machine shop to be built in that city that will cover 150 x 262.4 feet, one high story, concrete foundation, superstructure of steel and brick with saw-tooth roof, crane girders and the latest machine shop appliances.

Alexander Friend & Co., 148 LaSalle street, Chicago, real estate dealers, are preparing plans for a manufacturing building, to be built on the east side of Desplaines street, to cost about $100,000. It will be eight stories, 69 x 79 feet, reinforced concrete construction with pressed brick front.

General Industrial:—

The Northwestern Steel & Iron Works, Eau Claire, Wis., has increased its capital stock from $100,000 to $150,000.

The Nugent Tool Co., Cincinnati, has leased quarters at the southeast corner of Central and Kindell avenue for three years.

The Cyclops Iron Works, Nevada City, Cal., was recently awarded the contract for the construction of refrigerator plant at the Nevada county hospital, at a cost of $1,325.

The Canton Boiler & Engineering Co., Canton, O., was the lowest bidder at $11,000 for the construction of four 50,000-gallon steel water tanks at Fortress Monroe, Va.

The Indiana Foundry Co., Indiana, Pa., has been shipping stump pullers to Chili, Japan and other countries, and is introducing these implements in Siberia.

The machine shops of J. Morton Poole & Co., Wilmington, Del., have been running steadily on boring mills and machine castings, several contracts for which were received recently.

At a meeting of the creditors of the Dominion Pressed Steel Co., Port Elgin, Canada, recently, the usual measures were taken for the winding up of the company's business. J. A. McAndrews and J. H. Spencer were appointed inspectors. The company's liabilities are estimated at $20,000, and the assets nominally at $32,000.

The Climax Machine Co., Richmond, Ind., Grant Border and George Reiser proprietors, has established a shop in the old Null works on North F street, to do a general machine business.

The Niles Iron & Steel Co., Niles, O., closed June 11 for a period of four weeks for extensive repairs already outlined in these columns. The mill has had a very satisfactory run in the past year.

The Taylor Foundry & Engineering Co., of Grass Valley, Cal., has shipped a 10-ton vacuum filter to the Oregon Reduction Co. This is a duplicate of the one which the same company turned out for another mining company a short time ago.

The firms of Sargent & Son, manufacturers of plows and located at Castleton, Vt., and Osgood & Roundy, doing a general foundry business at Randolph, Vt., have consolidated, and will conduct business in one place not yet selected.

The Aluminum Foundry Co., Manitowoc, Wis., manufacturer of aluminum castings of all descriptions, advises that it has under consideration the erection of an additional foundry building, but it has not yet come to a decision regarding it.

The Central Foundry Supply Co., Columbus, O., which was recently incorporated to take over a foundry supply business already established, has organized by the election of the following officers: President, John A. Ball; vice president, Dwight R. Mason; secretary and treasurer, Charles E. Whiton. The company contemplates removing to larger and better quarters.

The American Roll & Foundry Co., Canton, O., manufacturer of chilled and sand rolls, rolling mill machinery and heavy castings of every description, advises respecting the recent increase in capital stock to $300,000, that the increase is a 7 per cent cumulative preferred stock, only one-half of which will be offered for sale at this time, the money to be used to increase the working capital, the remainder to be retained in the treasury, possibly to sell at some future time. At the present time, it is uncertain whether or not the stock will ever be sold, as some of the company's stockholders have about decided that they would prefer to advance this amount to the company rather than sell the stock.

The fourth annual meeting of the

Zenith Furnace Co., Duluth, resulted in the election of the following directors: W. L. Brown, C. P. Wheeler, C. T. Boynton, Chicago; H. G. Dalton, Cleveland; C. A. Duncan, A. M. Marshall, C. W. Andrews and Capt. A. B. Wolvin, of Duluth. The officers chosen were: President and treasurer, Capt. Wolvin; vice president, C. P. Wheeler; secretary, T. J. Davies. Satisfaction with the operation of the plant during the past year, and interest in the improvements which are being made was expressed by stockholders. The sum of $125,000 is being expended in alterations and improvements which will be completed in about 90 days, and it is expected that the furnace will blow in as soon as work is completed.

At the annual meeting of the stockholders of the Kokomo Steel & Wire Co., Kokomo, Ind., the following directors were elected: R. Ruddell, A. Conrad, A. A. Charles, George Charles, Thomas Harris, W. D. Parr, F. E. Rittenhouser, C. C. Shirley and J. E. Fredericks. Mr. Rittenhouser was elected to succeed E. T. Taylor, deceased. The annual report of the secretary and treasurer showed that the company's business has been more than usually prosperous during the past year, and that it is free of debt. The surplus fund has passed the half million dollar mark. The net earnings aggregated nearly $250,000, and for the past four months there has been shown an average profit of close to $40,000 a month. It is the intention of the company to increase the surplus to $700,000. While the big surplus was being accumulated the shareholders received the regular six per cent dividend annually.

Trade Notes:—

The Pressed Radiator Co., Pittsburg, manufacturing the Kinnear pressed radiators, announces that a branch office has been located in the Brunswick building, Fifth avenue and Twenty-sixth street, New York City.

Announcement is made by the Standard Roller Bearing Co., Philadelphia, of the recent installation at its factory of a thoroughly equipped testing laboratory, in charge of Walter H. Hart, an expert chemist formerly connected with the Alan Wood Iron & Steel Co.

The Standard Roller Bearing Co., Philadelphia, announces further expansion of its sales organization by the opening of a branch office at 327 Jefferson avenue, Detroit, in charge of Ernest L. Smith, recently appointed western representative.

Fires:—

The Bloomfield, N. J., plant of the American Malleables Co., a subsidiary of the American Brakeshoe & Foundry Co., sustained a loss of about $30,000 by fire June 14. The annealing building and shipping room was destroyed, but it is announced that no interference with deliveries will result.

The foundry of the Gawley Foundry & Machine Works, Tacoma, Wash., was damaged to the extent of about $500 by a small fire, June 8.

The pattern shop of the American Malleable Co., Bloomfield, N. J., was seriously damaged June 15, the loss being estimated at about $15,000.

Fire inflicted serious injury to the boiler and coppersmith shops of the Bath Iron Works, Bath, Me., June 13. The storage building, in which were kept many old patterns, as well as the machine shop were threatened. The loss is estimated at $75,000.

TRADE PUBLICATIONS.

ELECTRIC APPLIANCES.—The General Electric Co., Schenectady, is issuing Bulletins Nos. 4576 and 4584, respectively. In Bulletin No. 4576, Type F, form K-3 line of oil switches for panel installation and remote control is described. This switch is especially designed with a view to combining every element of satisfactory operation with low price, and is claimed to meet the most severe requirements of severe service on systems of 4,500 volts, or less. A very complete line of the switches is listed in the bulletin, which contains many data for selecting the proper switch, current transformer, etc., for any desired service. Bulletin No. 4584 contains 16 pages on the subject of the CQ motor, designed for direct-current circuits. Descriptions are given of motor generator sets, consisting of two CQ motors connected rigidly together. The application of the motor to linotype equipments, ventilating outfits, machine tools, etc., is also outlined. Tables of dimensions, capacities, etc., useful in preparing specifications are given.

SELF-DUMPING CAR HAUL.—F. C. Greene, Republic Bldg., Cleveland. Catalog, 35 pages. 6 x 8 inches. A general description of the Greene system of self-dumping car haul is given, enumerating and briefly describing the different parts, such as conveyors, driving mechanism, chains or ropes, moving parts, attachments, etc. The operation and construction are next detailed, with illustrations of many of the cars, clearly showing the construction, operating relation, and relative arrangement of the different parts and the adaptation of the car to various slopes, etc. Some of the advantages claimed by the manufacturer include safety of the cars and of the men working around the haul, saving in first cost, reduction in the cost of repairs, and the fact that one man is only needed to handle and dump the largest output, etc.

FRICTION CLUTCH.—The Merchant & Evans Co., Philadelphia. 40-page catalog relating to the "Hele-Shaw" clutch for motor cars and all other mechanical and industrial drives, and containing a lengthy discussion of clutch practice, its advantages, operation. A summary of the principles of action of this clutch is also given. Tables of standard sizes, price lists and a partial list of makers and dealers are given.

MECHANICAL DRAFT.—The American Blower Co., Detroit, is issuing a number of small pamphlets relating to mechanical draft, illustrating and describing hot blast apparatus, steel plate fans, exhaust fans, disc ventilating fans, "cyclone" fans, volume blowers, pressure blowers, engines, blast gates, dry kilns, drying apparatus, fan combinations, etc.

CORE MACHINES.—The Diamond Clamp & Flask Co., Richmond, Ind. Catalog. 19 pages. 6 x 9 inches. Automatic and plunger type core machines are described and illustrated. The principle and workings of these types of core machines are explained and tables of dimensions, capacities and price lists are given. The Diamond adjustable flask clamp, woods for snap flasks, various styles of flasks, core boxes or jackets, etc., are illustrated. Price lists and tables of dimensions of these are also given.

METAL.—A. Allan & Son, 1 Desbrosses street, New York, is sending out a 56-page catalog describing Allan metal used for bearings, pistons, valve discs, metallic packing, etc. A large number of testimonial letters are included in the booklet. The inventor of this metal claims for it efficient and economical service, simplicity, toughness and malleability, changeable color, etc.

AIR-HOISTING MACHINERY.—The Detroit Hoist & Machine Co., Detroit. Catalog. 6 x 9 inches. 16 pages. This catalog presents some of the designs of pneumatic geared hoists and compressed air appliances for hoisting or operating power devices. The hoists are designed and constructed to handle loads ranging from one to 10 tons to a height of 25 feet, or more, and also to reduce repairs to a nominal cost. Tables of sizes, capacities and price lists are given.

MACHINE TOOLS.—The Gisholt Machine Tool Co., Madison, Wis., is issuing a binder comprising the first leaves of the new series of Gisholt bulletins describing the different Gisholt labor saving machine tools, such as turret lathes, vertical boring and turning mills and universal tool grinders, etc.

CHUCKS.—The Skinner Chuck Co., New Britain, Conn. Small 39-page catalog, illustrating and describing drill and lathe chucks of several different types, planer chucks, scroll chucks, two jaw chucks, vises, arbors for drill chucks, castings for face plates, face plate jaws, reamer stands, etc.

CRUSHERS, PULVERIZERS AND FEEDERS.—The C. O. Bartlett & Snow Co., Cleveland. Catalog No. 25. 32 pages. 6 x 9 inches. The Triumph four-roll coal crusher illustrated and described in this booklet is designed and constructed to meet the requirements of large capacity and uniformity of product, with special reference to preparing coal for mechanical stokers; the Triumph double crushing roll represents the type adapted for crushing rock, iron ore, sandstone, limestone and all hard materials, is built very strong and substantial and is adapted for heavy service; the Triumph two-roll crusher is designed especially for crushing run-of-mine coal and the motor-driven two-roll crusher is designed for attachment directly to the coal hopper; the single crushing roll is used for small power plants, where a uniform size of crushed coal is desired; the "American" clay disintegrator, Champion crusher, Blake stone and ore crusher, Mogul crusher, Triumph rotary crusher, improved crusher, pulverizing or mixing cylinder, Triumph horizontal French buhr mill, Triumph rotary feeder, automatic feeder and other types are also illustrated and described and price lists of each type are presented.

IN THIS ISSUE: Plant of the Northwestern Iron Co.—Mining Talc in North Carolina—Plant of the Illinois Valley Sand Co.

THE IRON TRADE REVIEW

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THE
BOURNE-FULLER CO.
IRON, STEEL,
PIG IRON,
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Cleveland, Ohio.

Classified Index for Buyers, Page 78.

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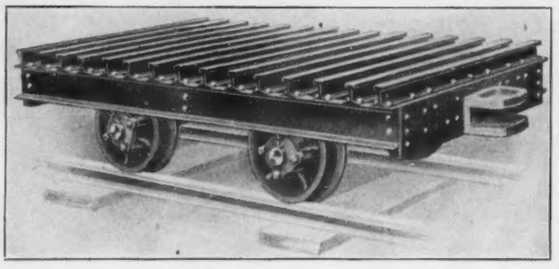

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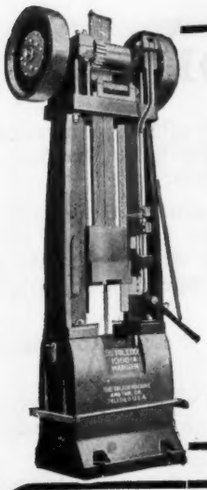

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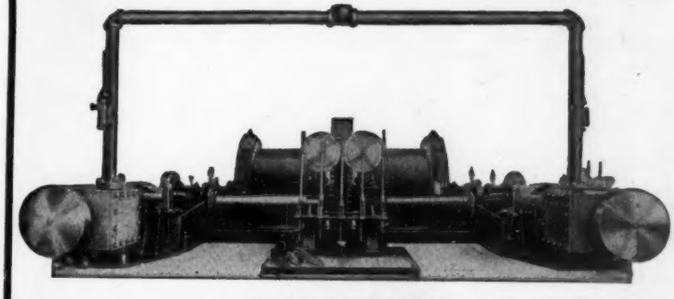

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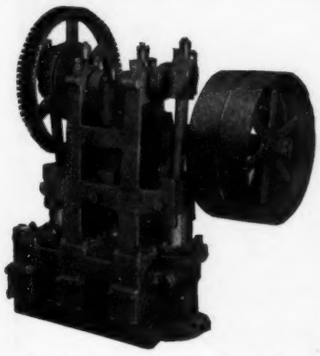

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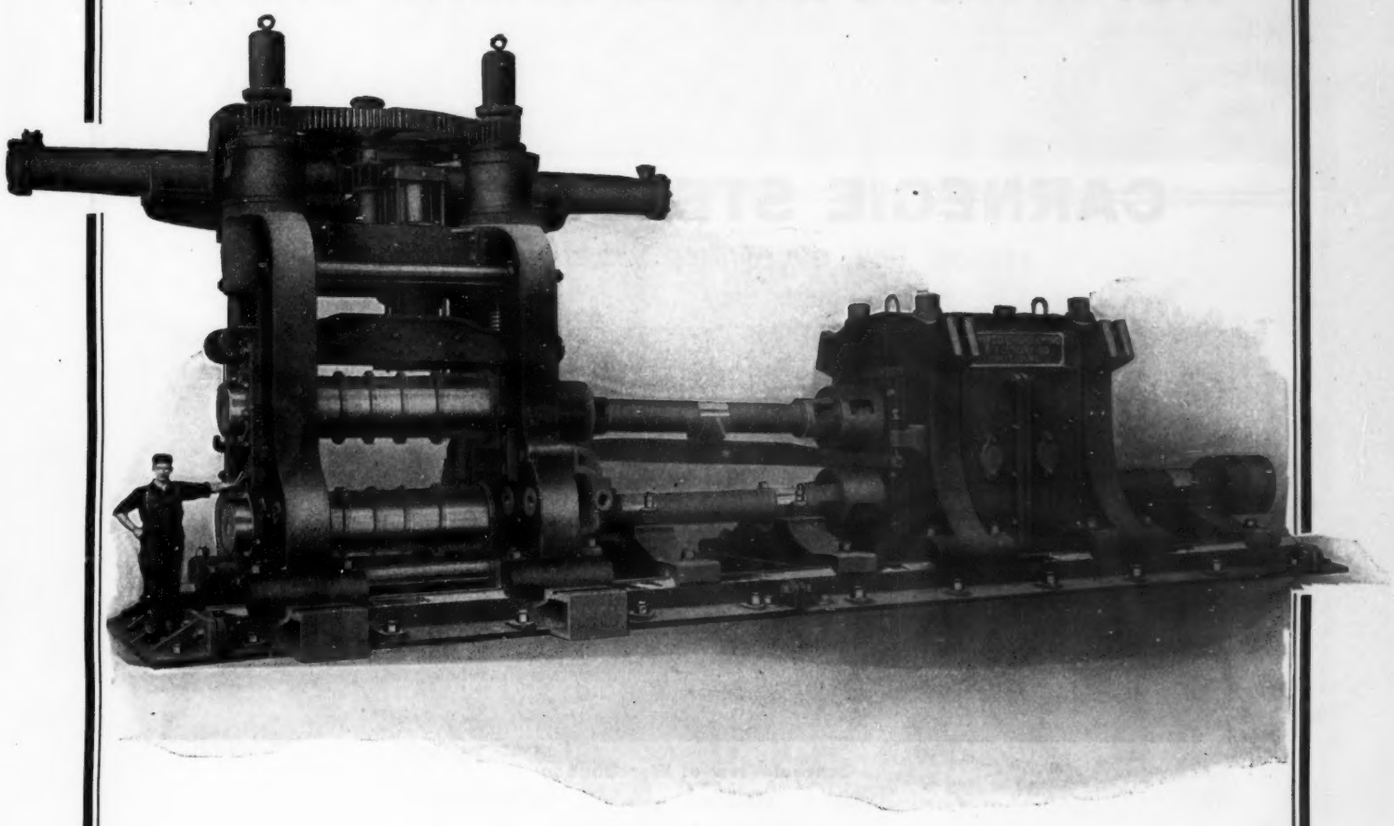

36" Blooming Mill.

SAND CHILLED **ROLLS** AND STEEL

Steel Castings up to 50 Tons
Cast Steel Machine Molded Gears up to 18 ft. Diameter
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"Vandergrift" Bronze Bearings for Mill Work

UNITED ENGINEERING & FOUNDRY CO.

Farmers Bank Building, Pittsburg, Pa.

"Largest Roll Makers in the World" **"Makers of the Largest Rolls"**

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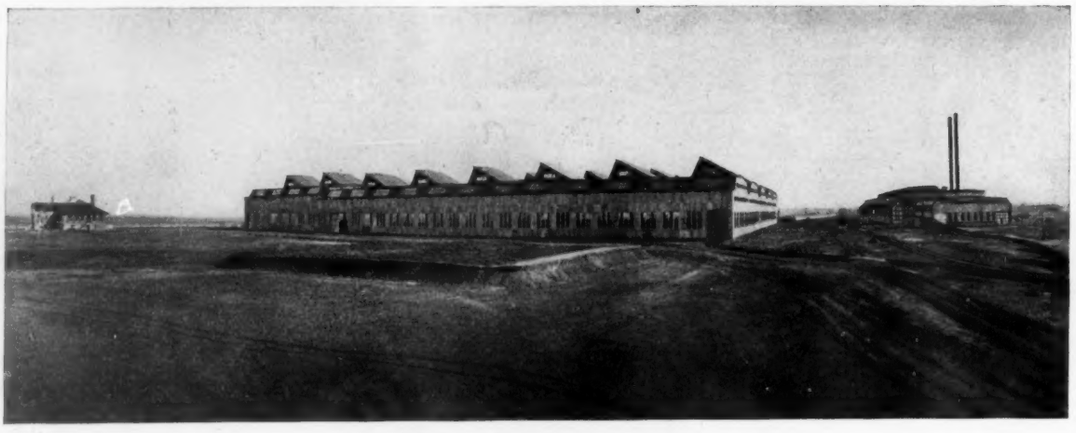
Warehouses and Structural Shops

of the

CARNEGIE STEEL COMPANY



General View of Warehouses

Stock of Steel Structural Shapes, Plates and Bar Mill Products, available for

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Bars *for* Reinforcing Concrete

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We neither manufacture nor sell boilers

But we are

The Largest Boiler Manufacturers' Supply House in America

We Offer **Everything You Need** From Chalk for the Layer-out to huge Hydraulic Riveters and Flange Presses. And we are just as polite in filling an order for a Calking Tool as we are in furnishing a $25,000 shop equipment.

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AND SHAPES

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OPEN HEARTH AND BESSEMER

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Billets Blooms Slabs Beams
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Cold Twisted Bars Spikes
Rivets Chain Chain Rods
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is a guarantee of long life to any structure. Every property owner wants the best he can get when it comes to the roof—that is why he specifies

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32 POUNDS COATING

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"The Terne which turns the elements"

For all classes of buildings—mills, factories, warehouses and homes—M. F. has a proven reputation for thorough protection against water, wind and fire. Then, too, with the weight of coating clearly stamped in the corner of every sheet, you know you're getting exactly what you specify. We will gladly send a sample piece of M. F. that you may examine it for yourself. M. F. bears close inspection.

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ROOFING
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EXTRA INLAND SOFT

Every One Perfect

BLACK SHEETS
Blue Annealed
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OPEN HEARTH AND BESSEMER

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Sheet Bars,
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DAILY SHIPMENTS 5000 TONS

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AMERICAN SHEET & TIN PLATE CO. APOLLO BEST BLOOM TRADE MARK REGISTERED

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Galvanized Sheets

By point of merit—the standard of all galvanized sheets. By point of superior value—the favorite of all sheet metal workers.

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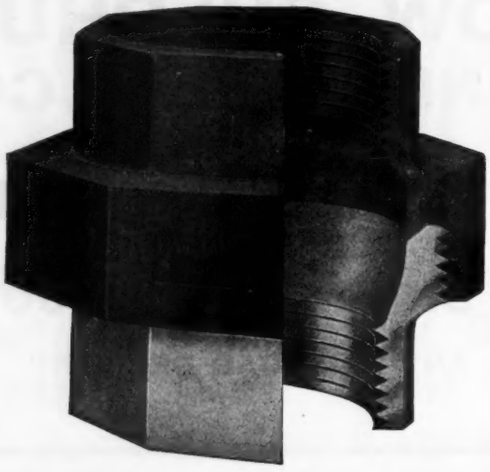
A NEW PROPOSITION

The principle of Accident, Death, Fire or Burglar Insurance is well understood, but how many mechanical men know all about "Leak Insurance"?

The "Kewanee" Union

OCTAGON



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THE PAID-UP POLICY

THERE ARE NO ASSESSMENTS

The original purchase price of the "Kewanee" Union covers all premiums and assessments for "Leak Insurance".

The Brass to Iron Thread Connection insures against leaks—it prevents possibility of corrosion, and even after long service the union can be easily disconnected and reconnected, for it never rusts together.

The Brass to Iron Ball Joint Seat insures against leaks without the use of the objectionable gasket, making a tight seal even when pipe is out of alignment.

The simplicity and strength of design (there are only three parts) insures against loss of inserted brass pieces—there are no parts to loosen or drop out and be lost.

Every "KEWANEE" UNION is tested with compressed air under water—therefore insured against leaks.

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All sizes and of quality to meet all requirements—Prompt Shipment.

ALSO

Basic Pig Iron, Open Hearth Steel Slabs, Sheet Bars, Universal Plates, Sheared Plates, Skelp, Pipe, Black and Galvanized Steel Sheets.

Our own ore is the basis of our nails and this, with the experience of more than half a century in their manufacture, insures uniformity of quality.

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Established in 1852

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NILES, OHIO

Manufacturers of

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WROUGHT IRON AND STEEL SHEETS
CORRUGATED ROOFING AND SIDING

Pure Wrought Iron Sheets and Roofing our Specialty

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Galvanized and Painted, Corrugated, V-crimp, Roll and Cap, Beaded Ceiling. Pressed Brick and Weather Board Siding.

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Gauges 16 to 30

A large Assortment of Roofings and Flat Galvanized Sheets always in Stock for Immediate Shipment. Special Sizes Rolled Quickly.

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Iron and Steel Castings

Rolling Mill Machinery

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Prompt deliveries.

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Polished Steel Shafting

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Special attention paid to Steel Scrap suitable for use in Both Basic and Acid open hearth Furnaces

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Want it?

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PLATES
STEEL TIRES

Modern facilities enable us to deliver any quantity—any size, at any time. Our customers know this—from others we solicit a trial order. Let our name be first in your mind when ordering.

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BEAMS
ANGLES
CHANNELS

30,000 Tons Steel

Regularly on hand for immediate shipment, in the warehouses of the Illinois Steel Co.'s

NORTH WORKS

Principal Stock Sizes are as follows:

ANGLES

¼" x ¼" x ⅛"
1" x 1" x ⅛" 3/16"
1¼" x 1¼" x ⅛" 3/16" ¼"
1½" x 1½" x ⅛" 3/16" ¼"
1¾" x 1¾" x 3/16" ¼"
2" x 1½" x 3/16"
2" x 2" x 3/16" ¼" 5/16" ⅜"
2¼" x 2¼" x ¼" 5/16"
2½" x 2" x 3/16" ¼" 5/16" ⅜"
2½" x 2½" x 3/16" ¼" 5/16" ⅜"
3" x 2" x ¼" 5/16" ⅜"
3" x 2½" x ¼" 5/16" ⅜"
3" x 3" x ¼" 5/16" ⅜" 7/16" ½"
3½" x 2½" x ¼" 5/16" ⅜" ½"
3½" x 3" x 5/16" ⅜" ½"
3½" x 3½" x 5/16" ⅜" 7/16" ½"
4" x 3" x 5/16" ⅜" 7/16" ½"
4" x 4" x 5/16" ⅜" 7/16" ½" ⅝" ¾"
5" x 3 " x 5/16" ⅜" ½"
5" x 3½" x 5/16" ⅜" 7/16" ½" ⅝"
5" x 5" x ⅜" ½" ⅝"
6" x 3½" x ⅜" ½" ⅝"
6" x 4" x ⅜" 7/16" ½" ⅝" ¾"
6" x 6" x ⅜" 7/16" ½" 9/16" ⅝" ¾" ⅞"
8" x 8" x ½" ¾" ⅞"

BEAMS

3"—5½ and 7½ lb.
4"—7½ and 10½ lb.
5"—9¾, 12¼, and 14¾ lb.
6"—12¼, 14¾, and 17¼ lb.
7"—15, 17½, and 20 lb.
8"—18, 20½, 23, and 25½ lb.
9"—21, 25, 30, and 35 lb.
10"—25, 30, 35, and 40 lb.
12"—31½, 35, 40, 45, 50, and 55 lb.
15"—42, 50, 60, 70, and 80 lb.
18"—55 and 70 lb.
20"—65, 80, and 100 lb.
24"—80 and 100 lb.

CHANNELS

3"—4 and 6 lb.
4"—5¼, 6¼, and 7¼ lb.
5"—6½, 9, and 11½ lb.
6"—8, 10½, 13, and 15½ lb.
7"—9¾, 12¼, 14¾, 17¼, and 19¾ lb.
8"—11¼, 13¾, 16¼, 18¾, and 21¼ lb.
9"—13¼, 15, 20, and 25 lb.
10"—15, 20, 25, 30, and 35 lb.
12"—20½, 25, 30, 35, and 40 lb.
13"—32 lb.
15"—33, 40, 45, 50, and 55 lb.

PLATES

7" x ¼" 5/16" ⅜" 7/16" ½" ⅝" ¾" 1"
8" x ¼" 5/16" ⅜" 7/16" ½" 9/16" ⅝"¾"1"
8½" x 3/16"
9" x ¼" 5/16" ⅜" 7/16" ½" ⅝" ¾" 1"
10" x ¼" 5/16" ⅜" 7/16" ½" 9/16" ⅝" ¾" 1"
12" x ¼" 5/16" ⅜" 7/16" ½" 9/16" ⅝" ¾" 1"
14" x ¼" 5/16" ⅜" 7/16" ½" 9/16" ⅝" ¾" 1"
16" x ¼" 5/16" ⅜" ½" 9/16" ⅝" ¾" 1"
18" x ¼" 5/16" ⅜" ½" ⅝" ¾"
20" x ¼" 5/16" ⅜" 7/16" ½" ⅝" ¾" 1"
22" x ¼" 5/16" ⅜" 7/16" ½" ⅝" ¾"
24" x ¼" 5/16" ⅜" 7/16" ½" ⅝" ¾" 1"
26" x ¼" 5/16" ⅜" 7/16" ½" ⅝" ¾"
28" x ¼" 5/16" ⅜" 7/16" ½" ⅝" ¾"
30" x ¼" 5/16" ⅜" 7/16" ½" ⅝" ¾" 1"
36" x 3/16" ¼" 5/16" ⅜" 7/16" ½" ⅝" ¾"
42" x ¼" 5/16" ⅜" 7/16" ½" ⅝" ¾"
48" x 3/16" ¼" 5/16" ⅜" 7/16" ½" ⅝" ¾"
60" x 3/16" ¼" 5/16" ⅜" ½" ⅝" ¾" ⅞" 1"
72" x ¼" 5/16" ⅜" ½"

BLUE ANNEALED SHEETS

No. 16, 36," 48," 54."
No. 10, 36," 48," 60."

CHECKERED PLATES

34" x 5/16" ⅜" ½"

RAILS AND SPLICES

12, 16, 20, 25, 30, 45, 60, 75, and 90 lb.

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½" ⅝" ¾" ⅞" 1"

RIVETS

½" ⅝" ¾" ⅞" 1"

ZEES

3" x ¼" 5/16" ⅜"
4" x ¼" 5/16" ⅜" 7/16" ½"
5" x 5/16" ⅜" 7/16" ½"
6" x ⅜" 7/16" ½"

TEES

1" x 1" x ⅛"
1¼" x 1¼" x 3/16"
1½" x 1½" x 3/16"
1¾" x 1¾" x ¼"
2" x 2" x ¼"
2¼" x 2¼" x ¼"
2½" x 2½" x 5/16"
3" x 3" x 5/16" ⅜"
3½" x 3" x ⅜"
3½" x 3½" x ⅜" ½"
4" x 4" x ½"
4" x 5" x ⅜" ½"

FLATS

1" x 3/16" ½"
1¼" x 3/16" ¼"
1½" x 3/16" ¼" 5/16" ⅜" ½" ⅝"
1¾" x ¼" 5/16" ⅜"
2" x 3/16" ¼" 5/16" ⅜" ½" ⅝" ¾"
2¼" x ¼" 5/16" ⅜" ½" ⅝"
2½" x ¼" 5/16" ⅜" ½" ⅝" ¾"
3" x ¼" 5/16" ⅜" 7/16" ½" ⅝" ¾" 1"
3½" x 5/16" ⅜" 7/16" ½" 9/16" ⅝" ¾" 1"
4" x ¼" 5/16" ⅜" 7/16" ½" 9/16" ⅝" ¾" 1" 1¼"
5" x ¼" 5/16" ⅜" 7/16" ½" 9/16" ⅝" ¾" 1"
6" x ¼" 5/16" ⅜" 7/16" ½" 9/16" ⅝" ¾" 1"

ROUNDS

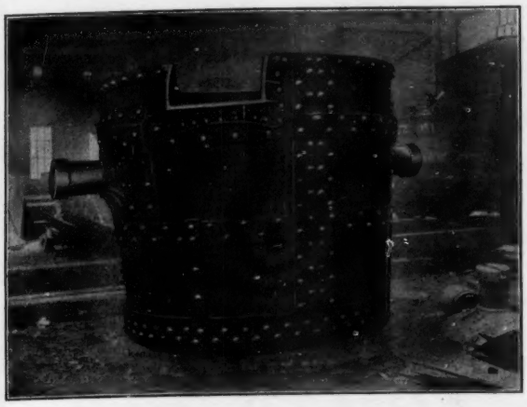
½" ⅝" ¾" ⅞" 1" 1¼" 1¼" 1¾" 1½"
1¾" 1¾" 1¾" 2" 2¼" 2½" 2¾" 3"
3¼" 3½" 3¾" 4" 4¼" 4½" 4¾" 5"

SQUARES

½" ⅝" ¾" ⅞" 1" 1¼" 1½" 1¾" 2"
2¼" 2½" 2¾" 3" 3¼" 3½" 3¾" 4"

Address

NORTH WORKS, CHICAGO



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Manufacture all classes of Steel Plate Construction, such as

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Mention The Iron Trade Review when writing.

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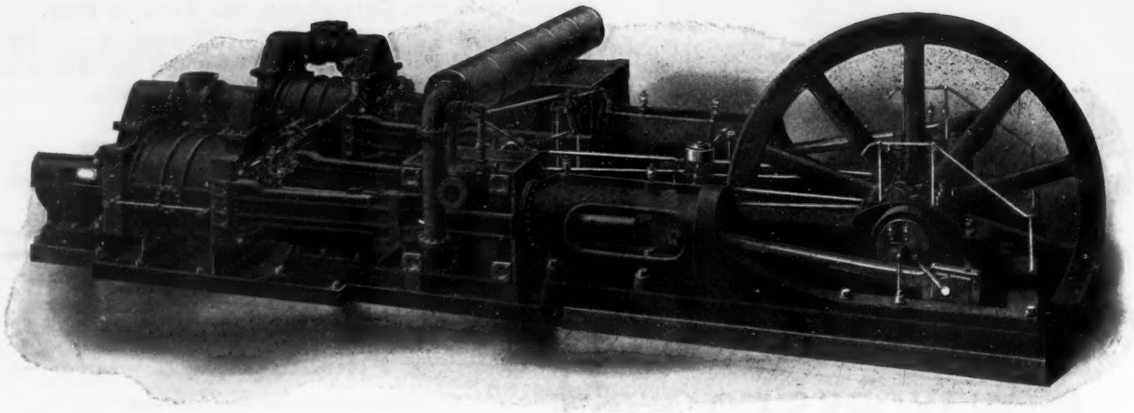

Horizontal Cross Compound Blowing Engine.

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BLOWING ENGINES

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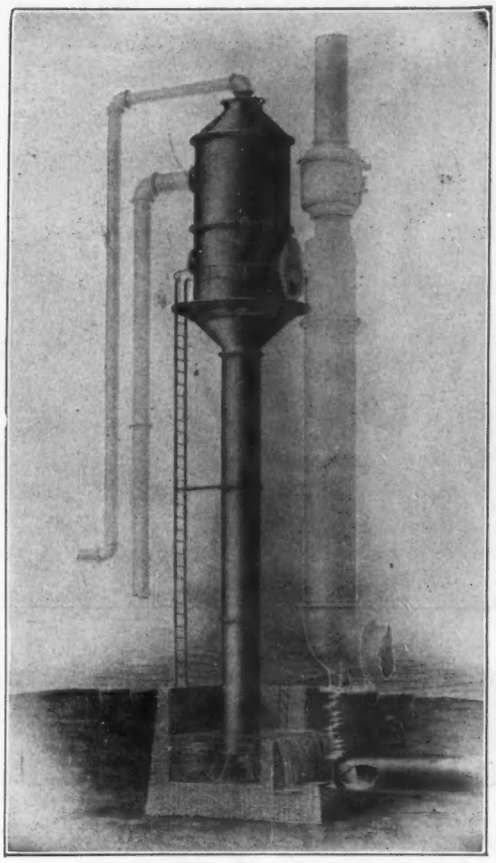

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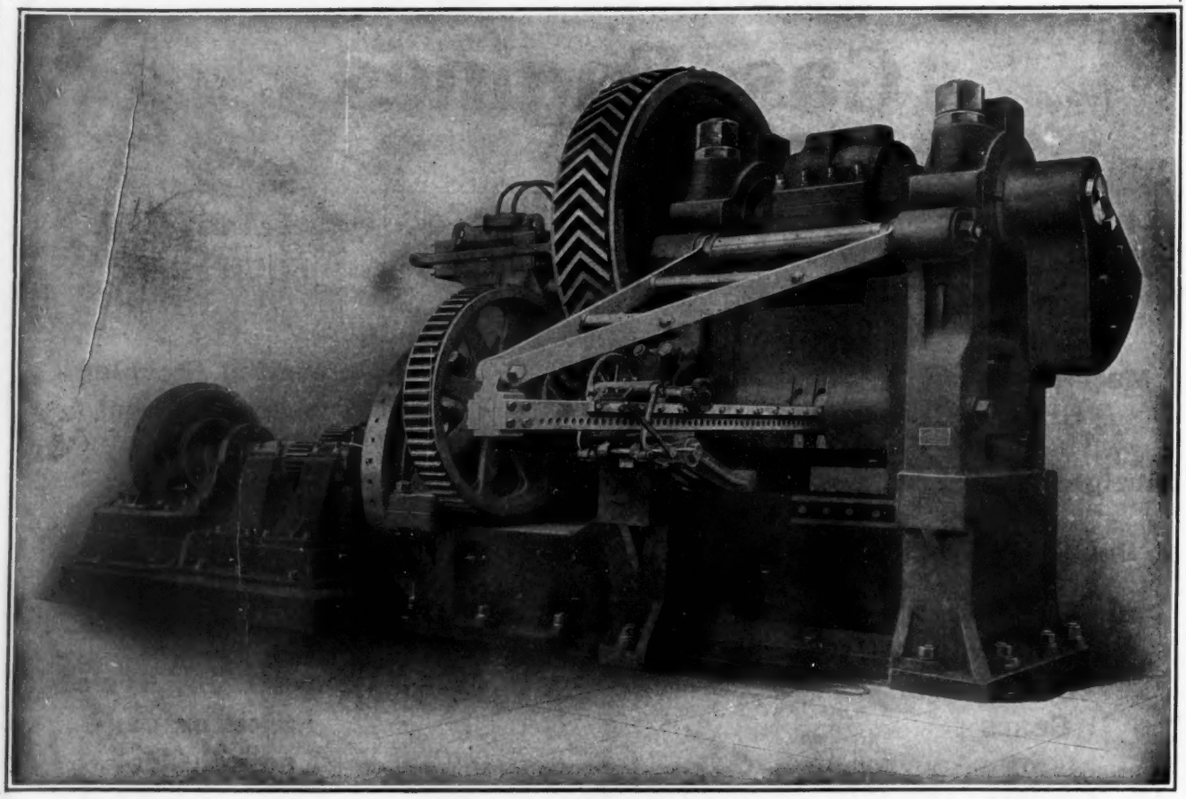
OF ALL KINDS



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Up to 10,000 H. P.

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Up to 30,000,000 Gal.

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Large Marine Boilers to 16 feet in Diameter
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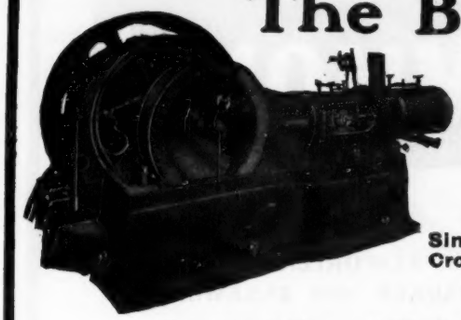

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DEAN BROS. STEAM PUMP WORKS

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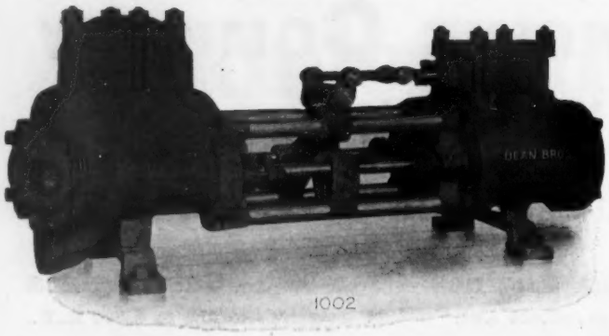

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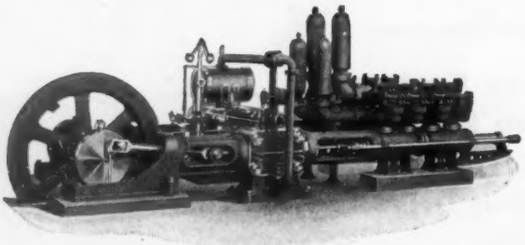
These pumps are a wide departure from the old style of duplex pumps. The steam cylinders are of a new type. The steam ports are arranged on a novel plan. The method of steam cushioning is new, and the valves are of an original form.

THEY WILL NOT SHORT STROKE

We have devised the only duplex pump that will make full stroke, and we have thereby overcome the most serious objections to Duplex pumps.

PRESCOTT CORLISS MINE PUMPING ENGINES



We also build Direct Acting Pumps for all conditions
SEND FOR CATALOGUE 20-C.

NOT the ordinary commercial engine, but one designed especially for mine pumping service.

Our long practical experience with the demands of mining conditions assures you of a superior construction in the Prescott Pumping Engine.

Fred. M. Prescott Steam Pump Co.
MILWAUKEE, WIS.

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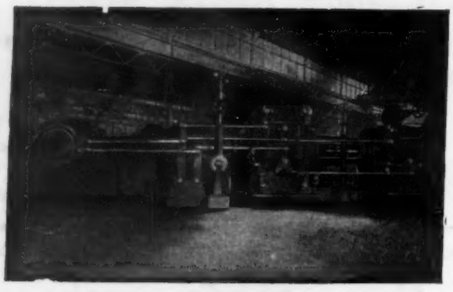
CORLISS
Rolling Mill Engines
All Types and Sizes



42 & 74 x 54 Roughing Mill Engine

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THE C. & G. COOPER CO.
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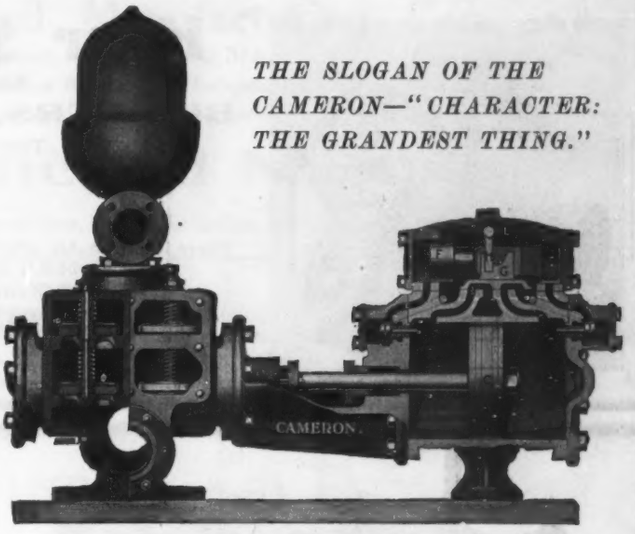

THE SLOGAN OF THE CAMERON—"CHARACTER: THE GRANDEST THING."

The Steam Mechanism, for instance! It consists of four stout pieces only. Then there's an absence of Outside Valve Gear. As the Steam Valve movement works in line with the piston rod, without the intervention of arms or levers, the Cameron can be run faster without danger of breaking, than any other steam pump.

Cameron Pumps are as reliable, efficient and long lived as 50 years' experience can make them. They run for years and years under conditions that would knock the "cheap varieties" out in no time, and their repairs are reduced to the minimum.

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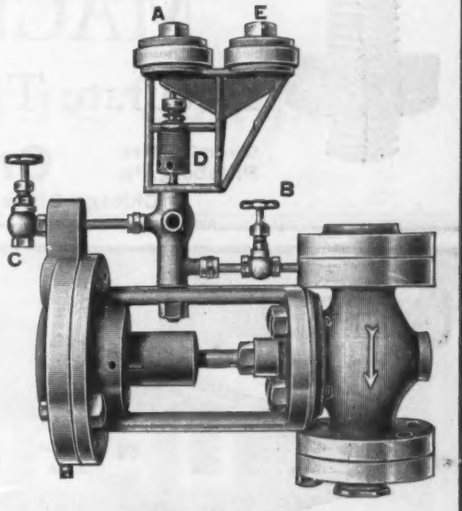
EASY OF ACCESS IS

THE SQUIRES EXCESS PUMP GOVERNOR



All parts may be inspected except the main valve with pump in operation and this is what it will do on boiler feed pumps, the use for which we build it.

Set the governor to stall the pump, at say, 10 pounds excess over boiler pressure. That's all—then watch the results. The ups and downs of the boiler pressure are closely followed by the governor and the same excess controls the pump regardless of boiler fluctuations. *Send for our catalog "G."*

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Without oil in the exhaust steam

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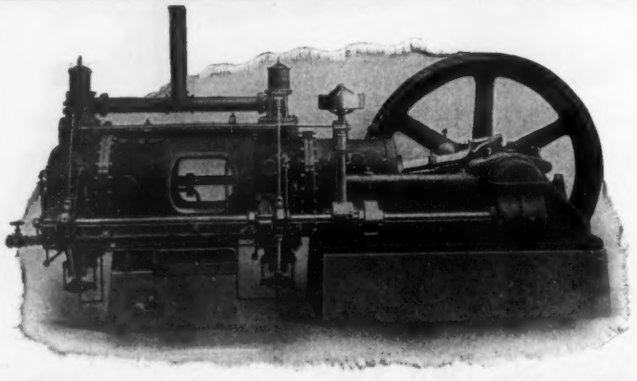

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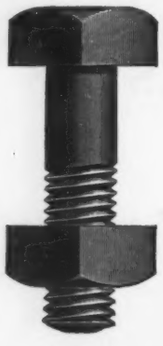

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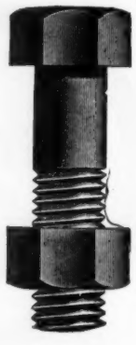

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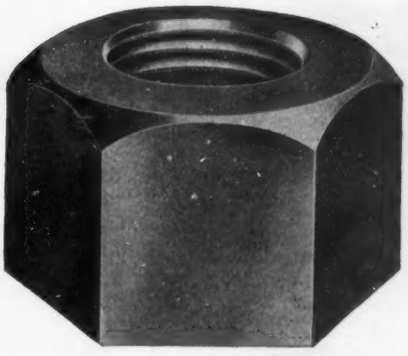

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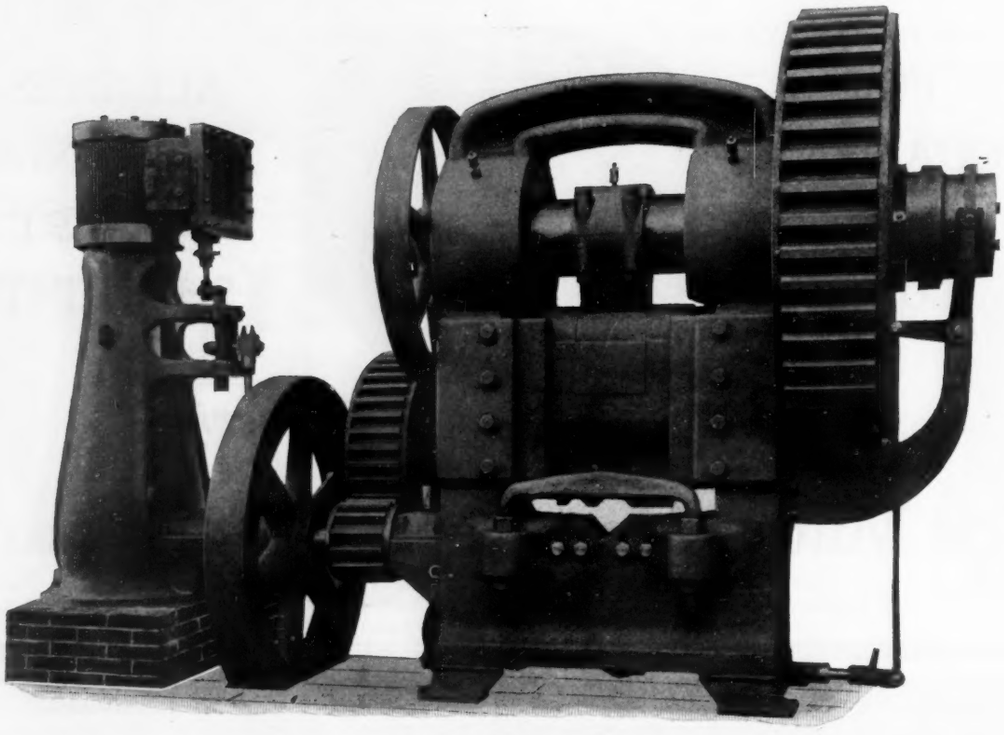

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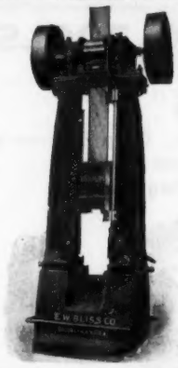

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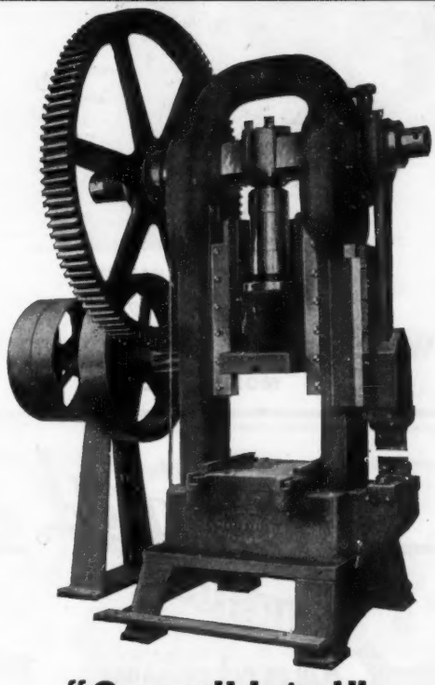

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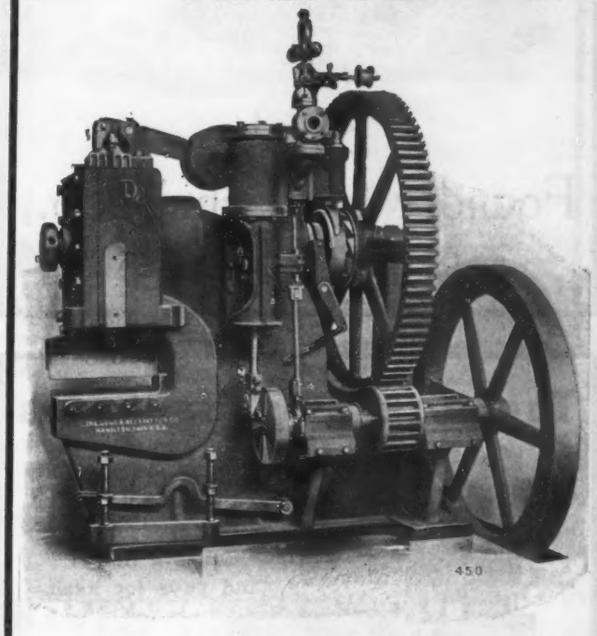

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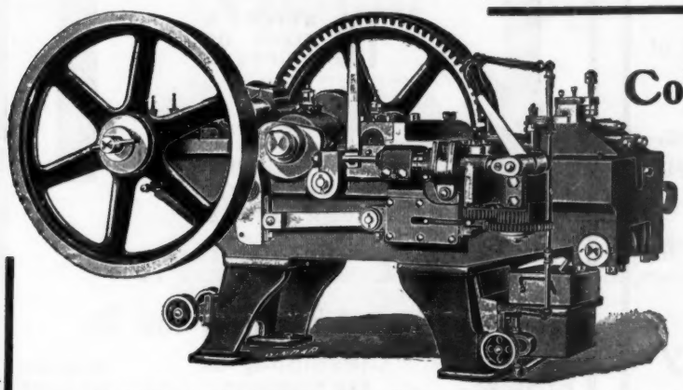

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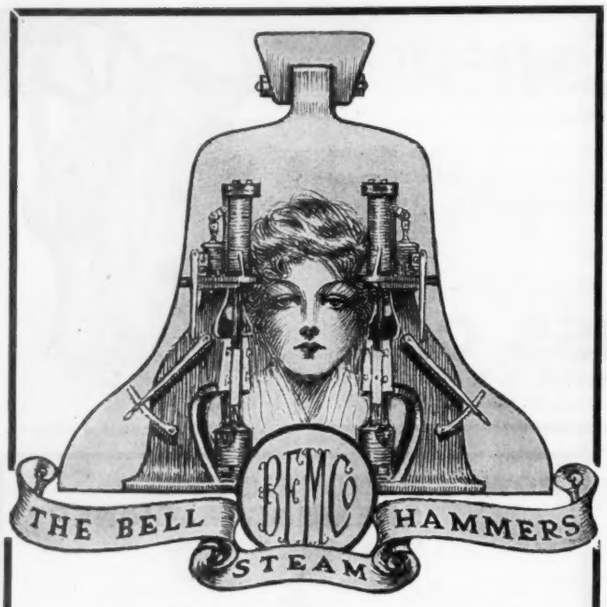

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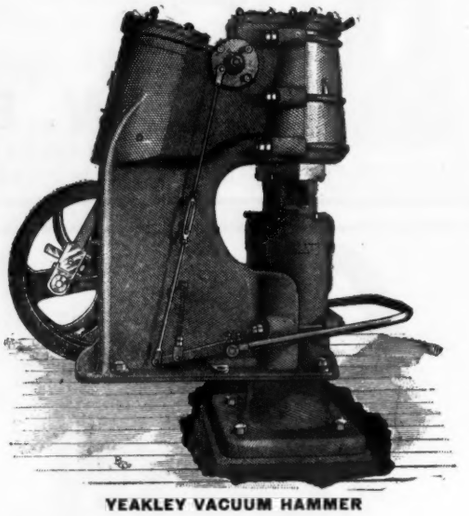

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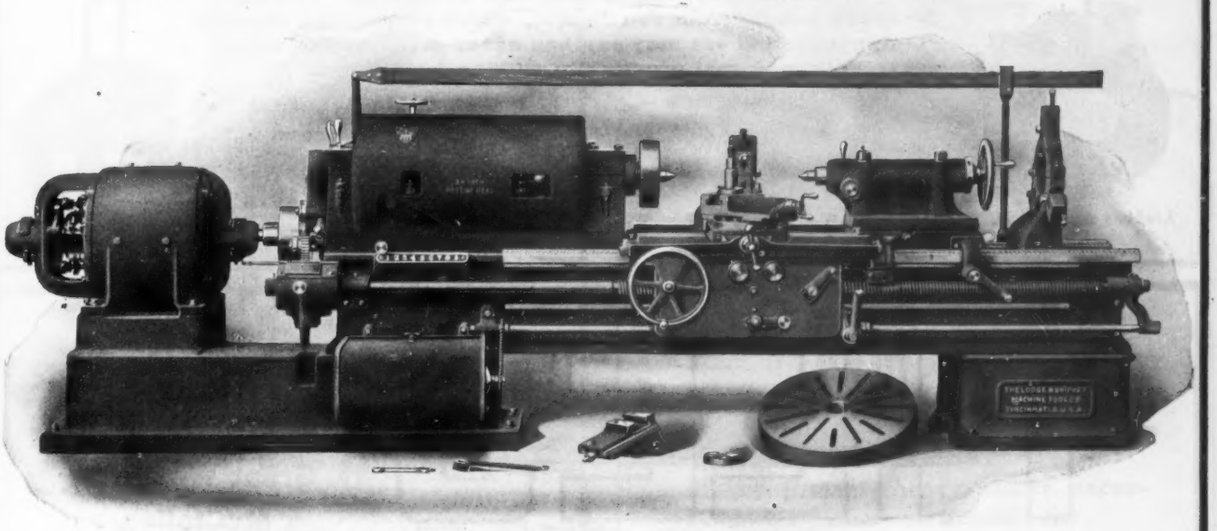
We are exhibiting a 24" Patent Head Screw Cutting Engine Lathe, driven by 10 H. P. motor, at the Master Mechanics', Master Car Builders' Convention, June 17th—24th, at Atlantic City.



24" Patent Head Lathe driven by 10 H. P. 2 to 1 variable speed motor, 450-900 RPM.

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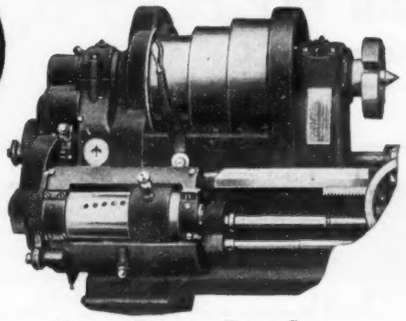

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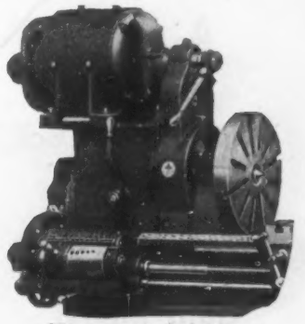

VARIABLE SPEED MOTOR

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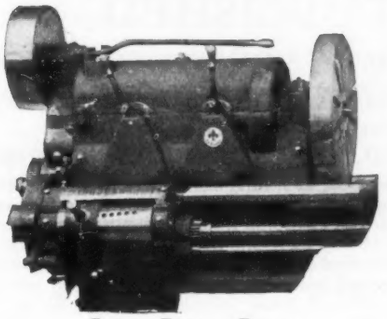

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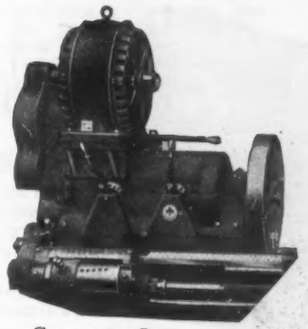

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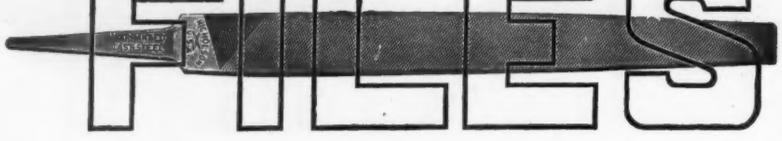

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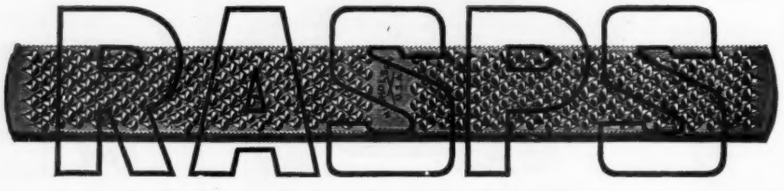

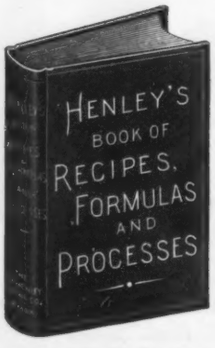

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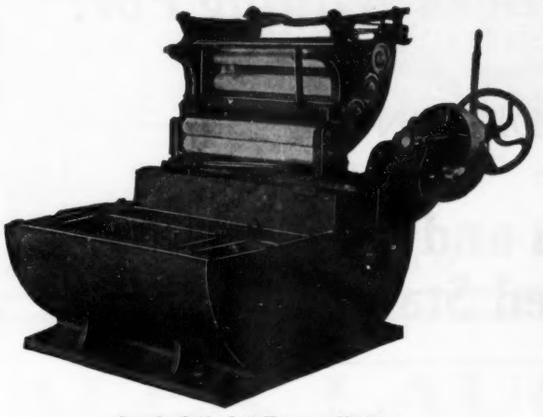

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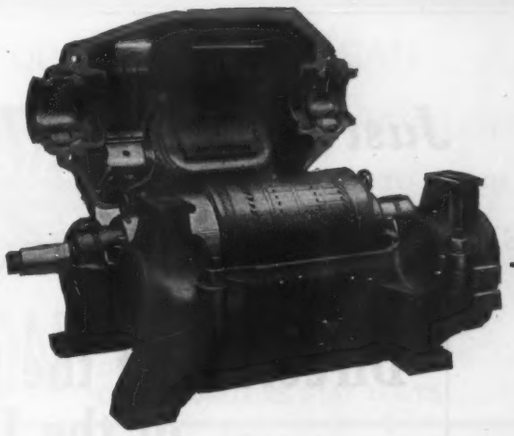

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Heavy Frames, heavy shafts, exceptional insulation and accessibility.

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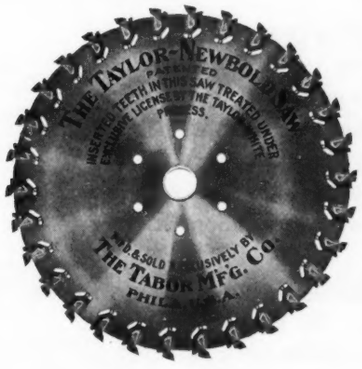

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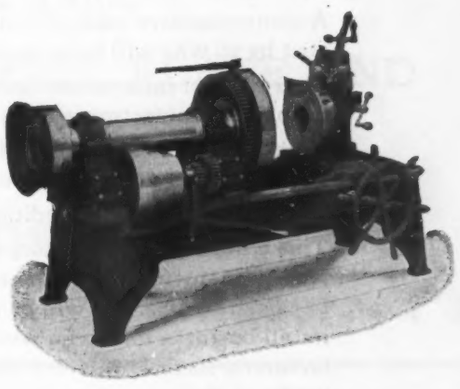

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of the

Directory of the Iron and Steel Works of the United States

The American Iron and Steel Association has just completed a thorough revision of its well-known Directory to the Iron and Steel Works of the United States, bringing down to March 1, 1908, complete descriptions of the equipment of all the **blast furnaces, rolling mills, Bessemer steel works, open-hearth steel works, crucible steel works, tin plate** and **terne plate works,** and **bloomaries** in every state, accompanied by names of owners, names of officers and selling agents, post-office addresses, a full list of all products, names of brands, and all other information that will naturally be looked for in a work of this character.

An exact system of cross references shows the relation of each plant to other plants under the same ownership.

The alphabetical arrangement of previous editions is retained.

A comprehensive table of contents and a complete index will be appreciated by all who will have occasion to consult this edition of the Directory.

Every line of information contained in the book has been obtained directly from the manufacturers and is given publicity by their authority.

In the preparation of this edition of the Directory the services of four experienced clerks have been constantly engaged for eighteen months.

This is the seventeenth edition of the Directory.

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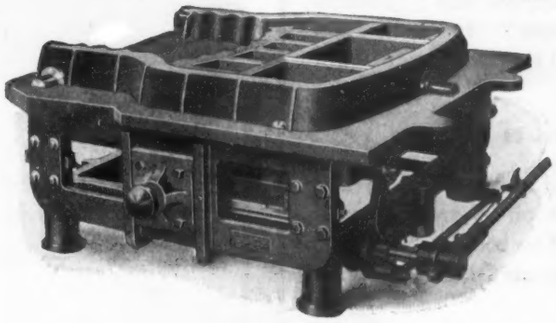

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Niagara Falls

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F-40

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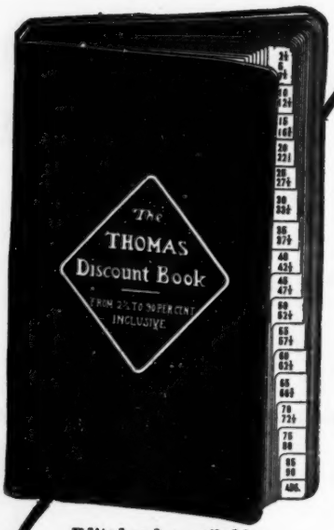

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Hook 'er to the Biler.

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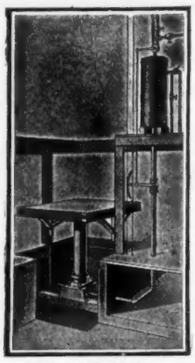

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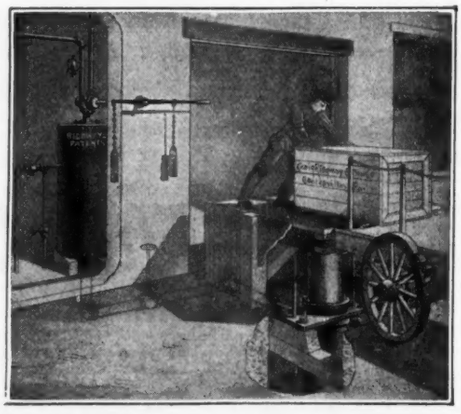

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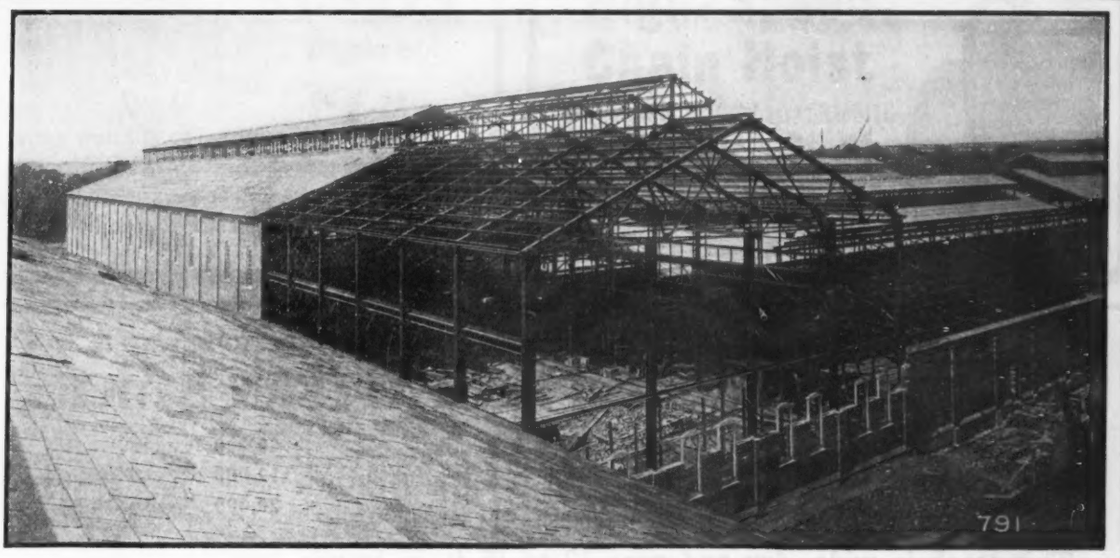

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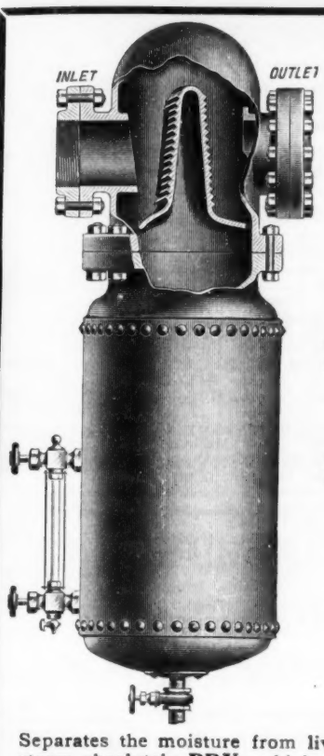

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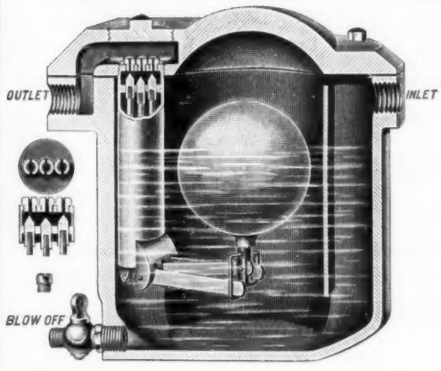

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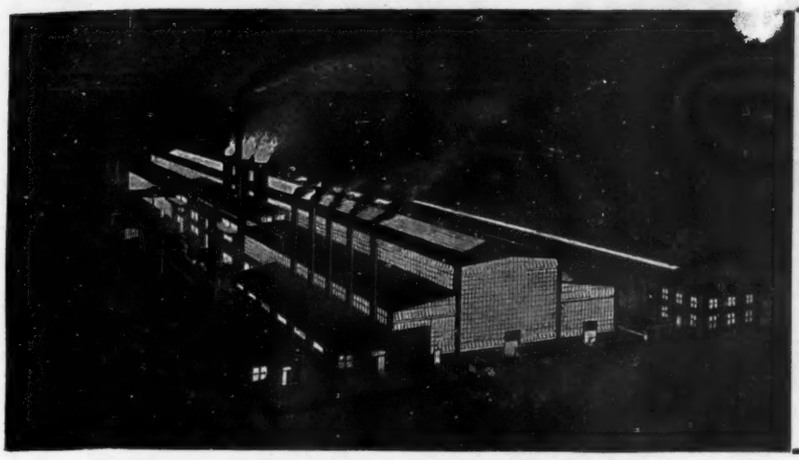

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†Standard Engineering Co. —
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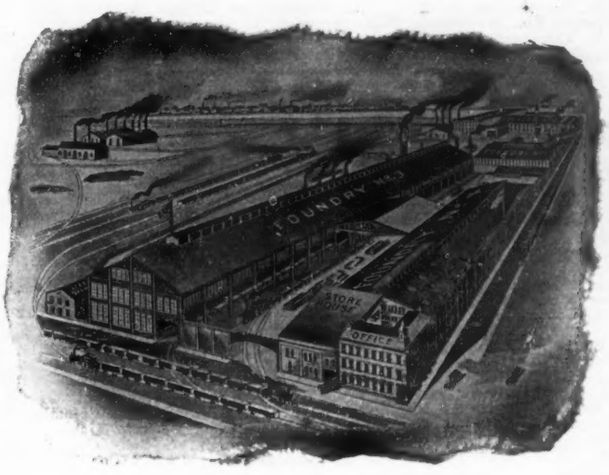

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Ryerson, Joseph T., & Son, Chicago, Ill.
Upson Nut Co., Cleveland, O.

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Meehan Boiler & Construction Co., Lowellville, O.
United Engineering & Fdy. Co., Pittsburg, Pa.

Boxes (Charging).

Meehan Boiler & Construction Co., Lowellville, O.
Morgan Engineering Co., Alliance, O.

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Stowe-Fuller Co., Cleveland, O.
Smith, J. D., Foundry Supply Co., Cleveland.
Soisson, Jos., Fire Brick Co., Connellsville, Pa.
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Chase Foundry & Mfg. Co., Columbus, O.
Youngstown Car Mfg. Co., Youngstown, O.

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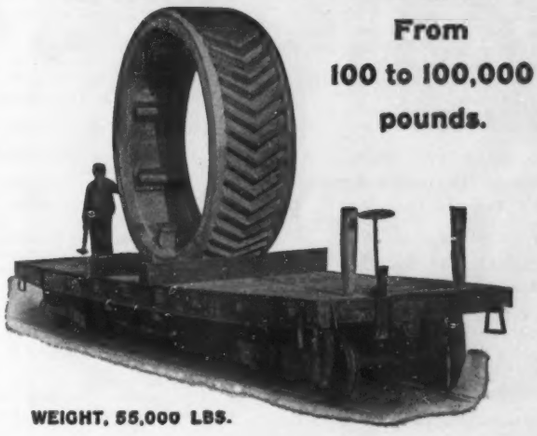

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Walker Foundry Co., Erie, Pa.
Walter, Wm. B., & Co., Chicago, Ill.

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Dake Engine Co., Grand Haven, Mich.
Eynon-Evans Mfg. Co., Philadelphia, Pa.
Mesta Machine Co., Pittsburg, Pa.
Pittsburg Valve Foundry & Construction Co., Pittsburg, Pa.
Powell, Wm., Co., Cincinnati, O.
United Engineering & Foundry Co., Pittsburg, Pa.
Walter, Wm. B., & Co., Chicago, Ill.

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Chicago Steel Foundry Co., Chicago, Ill.
Keystone Steel Casting Co., Chester, Pa.
Prime Steel Co., Milwaukee, Wis.

Castings (Die).

United Engineering & Fdy. Co., Pittsburg, Pa.

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Walker Foundry Co., Erie, Pa.

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Buffalo Foundry & Machine Co., Buffalo, N.Y.
Chambersburg Engineering Co., Chambersburg.
Cleveland Punch & Shear Works Co., Cleveland, O.
Curtis & Co. Mfg. Co., St. Louis, Mo.
Dake Engine Co., Grand Haven, Mich.
Erie Engine Works, Erie, Pa.
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Hubley Mfg. Co., Lancaster, Pa.
Lake Erie Engineering Works, Buffalo, N. Y.
Hubley Mfg. Co., Lancaster, Pa.
Macbeth Iron Co., Cleveland, O.
Marshall Foundry Co., Pittsburg, Pa.
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National Foundry Co., Erie, Pa.
Phoenix Iron Works Co., Meadville, Pa.
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Taylor-Wilson Mfg. Co., McKees Rocks, Pa.
Taylor & Boggis Fdy. Co., Cleveland, O.
Union Foundry & Machine Co., Pittsburg, Pa.
United Engineering & Foundry Co., Pittsburg, Pa.
United States Cast Iron Pipe & Foundry Co., New York City.
Walker Foundry Co., Erie, Pa.
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Wheeling Mold & Foundry Co., Wheeling, W. Va.
Youngstown Car Mfg. Co., Youngstown, O.
Youngstown Foundry & Machine Co., Youngstown, O.

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Ball Engine Co., Erie, Pa.
Buffalo Foundry & Machine Co., Buffalo, N.Y.
Hubley Mfg. Co., Lancaster, Pa.
Lake Erie Engineering Works, Buffalo, N. Y.
National Foundry Co., Erie, Pa.
Phoenix Iron Works Co., Meadville, Pa.
Ross-Meehan Foundry Co., Chattanooga, Tenn.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.
United Engineering & Fdy. Co., Pittsburg, Pa.
Walker Foundry Co., Erie, Pa.
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Castings (Malleable).

Acme Steel & Malleable Iron Works, Buffalo.
Albion Malleable Iron Co., Albion, Mich.
Chisholm & Moore Mfg. Co., Cleveland, O.
Dayton Malleable Iron Co., Dayton, O.
Erie Malleable Iron Co., Erie, Pa.
Flagg, Stanley G., & Co., Philadelphia, Pa.
Galesburg Mall. Castings Co., Galesburg, Ill.
Grand Rapids Malleable Works, Grand Rapids.
Jeffrey Mfg. Co., Columbus, O.
Lakeside Malleable Castings Co., Racine, Wis.
Meadville Malleable Iron Co., Meadville, Pa.
Mesta Machine Co., Pittsburg, Pa.
Missouri Malleable Iron Co., E. St. Louis, Ill.
Northern Malleable Iron Co., St. Paul, Minn.
Northwestern Malleable Iron Co., Milwaukee.
Ohio Malleable Iron Co., Columbus, O.
Port Huron Engine & Thresher Co., Port Huron, Mich.
Pratt & Letchworth Co., Buffalo, N. Y.
Ross-Meehan Foundry Co., Chattanooga, Tenn.
Standard Malleable Iron Co., Muskegon, Mich.
Symington Co., T. H., Baltimore, Md.
Union Malleable Iron Co., East Moline, Ill.
Walter, Wm. B., & Co., Chicago, Ill.
Waukesha Malleable Iron Co., Waukesha, Wis.
West Virginia Mall. Iron Co., Point Pleasant, W. Va.
Wisconsin Malleable Iron Co., Milwaukee, Wis.

Castings (Malleable, Car and Locomotive).

Acme Steel & Malleable Iron Works, Buffalo.
Albion Malleable Iron Co., Albion, Mich.
Dayton Malleable Iron Co., Dayton, O.
Jeffrey Mfg. Co., Columbus, O.
Lakeside Malleable Castings Co., Racine, Wis.
Missouri Malleable Iron Co., East St. Louis, Ill.
Northwestern Malleable Iron Co., Milwaukee.
Ohio Malleable Iron Co., Columbus, O.
Port Huron Engine & Thresher Co., Port Huron, Mich.
Pratt & Letchworth Co., Buffalo, N. Y.
Ross-Meehan Foundry Co., Chattanooga, Tenn.
Union Malleable Iron Co., East Moline, Ill.
Walter, Wm. B., & Co., Chicago, Ill.

Castings (Semi-Steel).

Ball Engine Co., Erie, Pa.
Birmingham Iron Foundry, Derby, Conn.
Flagg, Stanley G., & Co., Philadelphia, Pa.
Lake Erie Engineering Works, Buffalo, N. Y.
Mesta Machine Co., Pittsburg, Pa.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.
United Engineering & Fdy. Co., Pittsburg, Pa.
Walker Foundry Co., Erie, Pa.

Castings (Steel).

Acme Steel & Malleable Iron Works, Buffalo.
Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.
Bucyrus Steel Casting Co., Bucyrus, O.
Chambersburg Engineering Co., Chambersburg, Pa.
Curtis & Co. Mfg. Co., St. Louis, Mo.
Evans, David, & Co., Chicago, Ill.
Flagg, Stanley G., & Co., Philadelphia, Pa.
Keystone Steel Casting Co., Chester, Pa.
Massachusetts Steel Casting Co., Everett, Mass.
Mesta Machine Co., Pittsburg, Pa.
National Foundry Co., Erie, Pa.
Otis Steel Co., Cleveland, O.
Pratt & Letchworth Co., Buffalo, N. Y.
Prime Steel Co., Milwaukee, Wis.
Riverside Steel Casting Co., Newark, N. J.
Sharon Foundry Co., Sharon, Pa.
Solid Steel Casting Co., Chester, Pa.
United Engineering & Fdy. Co., Pittsburg, Pa.
Walter, Wm. B., & Co., Chicago, Ill.
Wellman-Seaver-Morgan Co., Cleveland, O.
West Steel & Iron Casting Co., Cleveland, O.
Youngstown Foundry & Machine Co., Youngstown, O.

Castings (Steel, Car and Locomotive).

Acme Steel & Malleable Iron Works, Buffalo.
Bucyrus Steel Casting Co., Bucyrus, O.
Mesta Machine Co., Pittsburg, Pa.
National Foundry Co., Erie, Pa.
Otis Steel Co., Cleveland, O.
Prime Steel Co., Milwaukee, Wis.
Pratt & Letchworth Co., Buffalo, N. Y.
Riverside Steel Casting Co., Newark, N. J.
United Engineering & Fdy. Co., Pittsburg, Pa.
Wellman-Seaver-Morgan Co., Cleveland, O.
Walter, Wm. B., & Co., Chicago, Ill.
West Steel & Iron Casting Co., Cleveland, O.

Castings (Steel, Electrical).

West Steel & Iron Casting Co., Cleveland, O.

Castings (Stove Plate.)

Taylor & Boggis Fdy. Co., Cleveland, O.

Castings (Vanadium).

United Engineering & Fdy. Co., Pittsburg, Pa.

Cement.

American Refractories Co., Chicago, Ill.
Universal Portland Cement Co., Chicago, Ill.

Chains.

Beals & Co., Buffalo, N. Y.
Jones & Laughlin Steel Co., Pittsburg, Pa.

Chaplets.

Obermayer, S., Co., Cincinnati, O.
Smith, J. D., Fdry. Supply Co., Cleveland, O.

Charcoal.

Hillman, J. H., & Son, Pittsburg, Pa.
Smith, J. D., Fdry. Supply Co., Cleveland, O.

Chemists (Analytical).

Emmerton, F. A., Cleveland, O.
Hunt, R. W., & Co., Chicago, Ill.
Peek, Francis J., & Co., Cleveland, O.

Chemists (Manufacturing).

Grasselli Chemical Co., Cleveland, O.
Roessler & Hasslacher Chemical Co., New York

Chisels (Cold).

Anderson Forge & Machine Co., Detroit, Mich.

Clutches.

Brown Hoisting Machinery Co., Cleveland, O.
Cincinnati Iron Store Co., Cincinnati, O.
Farrel Fdry. & Machine Co., Ansonia, Conn.
Palmer-Bee Co., Detroit, Mich.

Coal and Coke.

Baird & West, Detroit, Mich.
Bessemer Coke Co., Pittsburg, Pa.
Blair, Reed F., & Co., Pittsburg, Pa.
Bourne-Fuller Co., Cleveland, O.
Columbus Iron & Steel Co., Columbus, O.
DeCamp Bros. & Yule Iron, Coal & Coke Co., St. Louis, Mo.
Eaton, Rhodes & Co., Cincinnati, O.
Devevoise, Anderson & Co., New York City.
Hammond-Byrd Co., Birmingham, Ala.
Hanna, M. A., & Co., Cleveland, O.
Hillman, J. H., & Son, Pittsburg, Pa.
Jamison Coal & Coke Co., Pittsburg, Pa.
La Belle Iron Works Co., Steubenville, O.
McKeefrey & Co., Leetonia, O.
Mudge & Co., Edmund W., Pittsburg, Pa.
Rogers, Brown & Co., Cincinnati, O.
Shanklin, Jas. R., & Co., Cincinnati, O.
Stewart Iron Co., Ltd., Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Pittsburg, Pa.
Thompson & Co., W. H., Philadelphia, Pa.
Walter-Wallingford & Co., Cincinnati, O.
Washington Coal & Coke Co., Pittsburg, Pa.
Wister & Co. L. & R., Philadelphia, Pa.

Cocks (Gauge).

Chaplin Fulton Mfg. Co., Pittsburg, Pa.
Jenkins Bros., New York City.
Wright Mfg. Co., Detroit, Mich.

Coils (Pipe).

Green Fuel Economizer Co., Matteawan, N. Y.
Pittsburg Valve Foundry & Construction Co., Pittsburg, Pa.
Rempe Co., Chicago, Ill.

Columns (Water).

Wright Mfg. Co., Detroit, Mich.

Columns (Water Alarm).

Wright Mfg. Co., Detroit, Mich.

Compound (Core).

Hill & Griffith Co., Cincinnati, O.
Obermayer Co., S., Cincinnati, O.
Smith Fdry. Supply Co., J. D., Cleveland, O.

Compressors (Air).

American Air Compressor Works, New York
Baird Machinery Co., Pittsburg, Pa.
Bury Compressor Co., Erie, Pa.
Cameron Steam Pump Works, A. S., New York City.
Curtis & Co. Mfg. Co., St. Louis, Mo.
Dean Bros. Steam Pump Works, Indianapolis.
Deming Bros., Salem, O.
Eynon-Evans Mfg. Co., Philadelphia, Pa.
General Electric Co., Schenectady, N. Y.
McGowan Co., John H., Cincinnati, O.
Mesta Machine Co., Pittsburg, Pa.
Norwalk Iron Works Co., So. Norwalk, Conn.
Scully Steel & Iron Co., Chicago, Il.
Shepard Electric Crane & Hoist Co., Montour Falls, N. Y.
Wickes Bros., Pittsburg.
Wisconsin Engine Co., Corliss, Wis.

Compressors (Gas).

Bury Compressor Co., Erie, Pa.
Norwalk Iron Works Co., So. Norwalk, Conn.

Condensers (Steam).

Cameron Steam Pump Works, A. S., New York City.
Cooper Co., C. & G., Mount Vernon, O.
Dean Bros. Steam Pump Works, Indianapolis.
Eynon-Evans Mfg. Co., Philadelphia, Pa.
McGowan Co., John H., Cincinnati, O.

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STEEL & MALLEABLE IRON WORKS
Buffalo, N. Y.

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STEEL CASTINGS
Also Gray Iron Castings
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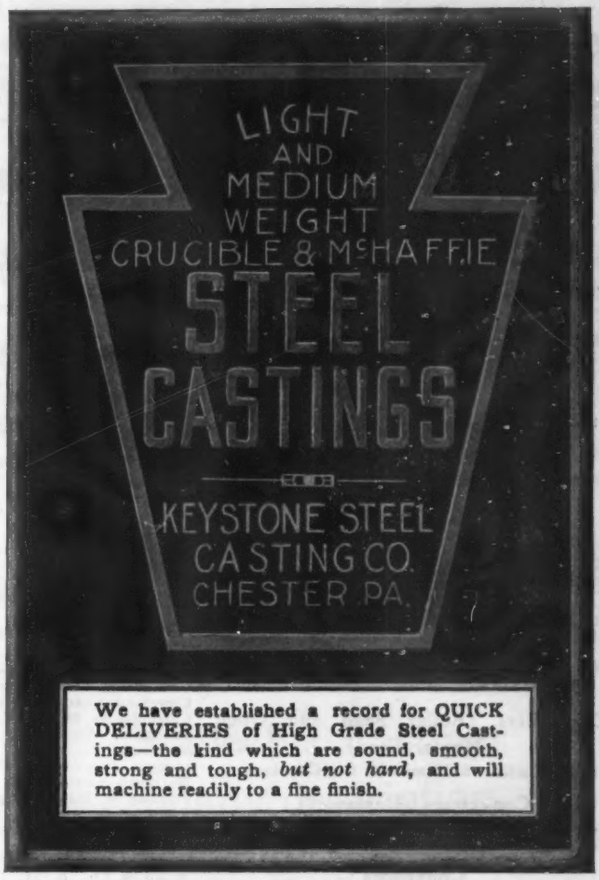

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Special Attention given to Designing

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Flats
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Mesta Machine Co., Pittsburg, Pa.
Prescott Steam Pump Co., Fred M., Milwaukee, Wis.
Rempe Co., Chicago, Ill.
Southwark Foundry & Machinery Co., Philadelphia, Pa.

Construction (Concrete).

Kratzer & Co., W. N., Pittsburg, Pa.
Pittsburg Construction Co., Pittsburg, Pa.

Construction (Steel and Iron).

American Bridge Co. of New York, New York
Bellefontaine Bridge & Steel Co., Bellefontaine, O.
Eichleay, John Jr. Co., Pittsburg, Pa.
Interstate Engineering Co., Cleveland, O.
Kratzer & Co., W. N., Pittsburg, Pa.
McClintic-Marshall Construction Co., Pittsburg.
Pittsburg Construction Co., Pittsburg, Pa.
Pittsburg Steel Construction Co., Pittsburg, Pa.
Riter-Conley Mfg. Co., Pittsburg, Pa.
Scaife & Sons Co., Wm. B., Pittsburg, Pa.
Struthers-Wells Co., Warren, O.

Construction (Steel Plate).

Canton Boiler & Engineering Co., Canton, O.

Controllers.

Allen, John F., New York City.
Alliance Machine Co., Alliance, O.
Chambersburg Engineering Co., Chambersburg.
Electric Controller & Supply Co., Cleveland, O.
General Electric Co., Schenectady, N. Y.
Morgan Engineering Co., Alliance, O.
Shepard Electric Crane & Hoist Co., Montour Falls, N. Y.
Westinghouse Electric & Manufacturing Co., Pittsburg, Pa.

Controllers (Boiler Feed and Open Heater Feed).

Strong, Carlisle & Hammond Co., Cleveland, O.

Converters (Bessemer).

Petroleum Iron Works Co., Sharon, Pa.
Tod Co., William, Youngstown, O.

Conveyors.

Bartlett & Snow Co., C. O., Cleveland, O.
Caldwell & Son Co., H. W., Chicago, Ill.
Interstate Engineering Co., Bedford, O.
Jeffrey Mfg. Co., Columbus, O.
McMyler Mfg. Co., Cleveland, O.

Countershafts.

Norton Co., Worcester, Mass.

Countershafts (Variable Speed).

Norton Co., Worcester, Mass.

Couplings.

Bliss Co., E. W., Brooklyn, N. Y.
Bradley & Son, C. C., Syracuse, N. Y.
Caldwell & Son Co., H. W., Chicago, Ill.
Cleveland Pneumatic Tool Co., Cleveland, O.
Electric Controller & Supply Co., Cleveland, O.
Jones & Laughlin Steel Co., Pittsburg, Pa.
Palmer-Bee Co., Detroit, Mich.

Couplings (Air Hose).

Cleveland Pneumatic Tool Co., Cleveland, O.
Globe Machine & Stamping Co., Cleveland, O.

Cranes (Charging).

Alliance Machine Co., Alliance, O.
Case Mfg. Co., Columbus, O.
Morgan Engineering Co., Alliance, O.
Pawling & Harnischfeger, Milwaukee, Wis.
Whiting Foundry Equipment Co., Harvey, Ill.

Cranes (Electric Traveling).

Alliance Machine Co., Alliance, O.
Brown Hoisting Machinery Co., Cleveland, O.
Case Mfg. Co., Columbus, O.
Chambersburg Engineering Co., Chambersburg.
Chisholm & Moore Mfg. Co., Cleveland, O.
Cincinnati Iron Store Co., Cincinnati, O.
Cleveland Crane & Car Co., Wickliffe, O.
Curtis & Co. Mfg. Co., St. Louis, Mo.
Industrial Works, Bay City, Mich.
Interstate Engineering Co., Bedford, O.
Macbeth Iron Co., Cleveland, O.
Marion Steam Shovel Co., Marion, O.
McIntosh-Hemphill & Co., Ltd., Pittsburg, Pa.
McMyler Mfg. Co., Cleveland, O.
Morgan Engineering Co., Alliance, O.
New England Engineering & Equipment Co., Boston, Mass.
Niles-Bement-Pond Co., New York City.
Northern Engineering Works, Detroit, Mich.
Pawling & Harnischfeger, Milwaukee, Wis.
Ridgway & Son, Craig, Coatesville, Pa.
Shepard Electric Crane & Hoist Co., Montour Falls, N. Y.
Wellman-Seaver-Morgan Co., Cleveland, O.
Whiting Foundry Equipment Co., Harvey, Ill.
Wood & Co., R. D., Philadelphia, Pa.

Cranes (Gantry).

Alliance Machine Co., Alliance, O.
Brown Hoisting Machinery Co., Cleveland, O.
Case Mfg. Co., Columbus, O.
Cleveland Crane & Car Co., Wickliffe, O.
Curtis & Co. Mfg. Co., St. Louis, Mo.
Interstate Engineering Co., Bedford, O.
Morgan Engineering Co., Alliance, O.
Pawling & Harnischfeger, Milwaukee, Wis.
Wood & Co., R. D., Philadelphia, Pa.

Cranes (Hand Traveling).

Alliance Machine Co., Alliance, O.
Brown Hoisting Machinery Co., Cleveland, O.
Case Mfg. Co., Columbus, O.
Chisholm & Moore Mfg. Co., Cleveland, O.
Detroit Hoist & Machine Co., Detroit, Mich.
Morgan Engineering Co., Alliance, O.
Niles-Bement-Pond Co., New York City.
Northern Engineering Works, Detroit, Mich.
Pawling & Harnischfeger, Milwaukee, Wis.
Whiting Foundry Equipment Co., Harvey, Ill.

Cranes (Hydraulic).

Alliance Machine Co., Alliance, O.
Chambersburg Engineering Co., Chambersburg.
Morgan Engineering Co., Alliance, O.
United Engineering & Fdy. Co., Pittsburg, Pa.
Wellman-Seaver-Morgan Co., Cleveland, O.

Cranes (Jib).

Alliance Machine Co., Alliance, O.
Brown Hoisting Machinery Co., Cleveland, O.
Case Mfg. Co., Columbus, O.
Cleveland Crane & Car Co., Wickliffe, O.
Chisholm & Moore Mfg. Co., Cleveland, O.
Industrial Works, Bay City, Mich.
Interstate Engineering Co., Bedford, O.
Morgan Engineering Co., Alliance, O.
Northern Engineering Works, Detroit, Mich.
Pawling & Harnischfeger, Milwaukee, Wis.
Ridgway & Son Co., Craig, Coatesville, Pa.
Shepard Electric Crane & Hoist Co., Montour Falls, N. Y.
Whiting Foundry Equipment Co., Harvey, Ill.
Wood & Co., R. D., Philadelphia, Pa.

Cranes (Locomotive).

Brown Hoisting Machinery Co., Cleveland, O.
Case Mfg. Co., Columbus, O.
Cleveland Crane & Car Co., Wickliffe, O.
Industrial Works, Bay City, Mich.
Interstate Engineering Co., Bedford, O.
McMyler Mfg. Co., Cleveland, O.
Morgan Engineering Co., Alliance, O.
Northern Engineering Works, Detroit, Mich.
Wellman-Seaver-Morgan Co., Cleveland, O.

Cranes (Pneumatic).

Brown Hoisting Machinery Co., Cleveland, O.
Case Mfg. Co., Columbus, O.
Industrial Works, Bay City, Mich.
Northern Engineering Works, Detroit, Mich.
Shepard Electric Crane & Hoist Co., Montour Falls, N. Y.

Cranes (Special).

Alliance Machine Co., Alliance, O.
Case Mfg. Co., Columbus, O.
Cleveland Crane & Car Co., Wickliffe, O.
Morgan Engineering Co., Alliance, O.
New Jersey Foundry & Machine Co., New York City.
Northern Engineering Works, Detroit, Mich.
United Engineering & Fdy. Co., Pittsburg, Pa.

Crankshafts (Forged).

Erie Forge Co., Erie, Pa.

Crucibles.

Dixon Crucible Co., Joseph, Jersey City, N. J.
Hill & Griffith Co., Cincinnati, O.
Obermayer, S., Co., Cincinnati, O.
Smith Fdry. Supply Co., J. D., Cleveland, O.

Cupolas.

Hill & Griffith Co., Cincinnati, O.
Northern Engineering Works, Detroit, Mich.
Obermayer, S., Co., Cincinnati, O.
Paxson Co., J. W., Philadelphia, Pa.
Riter-Conley Mfg. Co., Pittsburg, Pa.
Scaife & Sons, Wm. B., Pittsburg, Pa.
Smith Fdry. Supply Co., J. D., Cleveland, O.
Whiting Foundry Equipment Co., Harvey, Ill.

Cups (Grease).

Caldwell & Son Co., H. W., Chicago, Ill.
Powell Co., Wm., Cincinnati, O.

Cutters.

Landis Tool Co., Waynesboro, Pa.
National Machinery Co., Tiffin, O.
Standard Engineering Co., Ellwood City, Pa.

Cutters (Milling High Speed & Carbon Steel).

Huther Bros. Saw Mfg. Co., Rochester, N. Y.

Cutters (Sprue).

Bliss Co., E. W., Brooklyn, N. Y.
Ferracute Machine Co., Bridgeton, N. J.
Smith Fdry. Supply Co., J. D., Cleveland, O.
Toledo Machine & Tool Co., Toledo, O.
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

Cylinders (Cement).

Canton Boiler & Engineering Co., Canton, O.

Daubing (Cupola).

Obermayer, S., Co., Cincinnati, O.

Dies.

American Tube & Stamping Co., Bridgeport.
Avery Stamping Co., Cleveland, O.
Cleveland Die & Mfg. Co., Cleveland, O.
Cleveland Punch & Shear Works Co., Cleveland, O.
Consolidated Press & Tool Co., Hastings, Mich.
Ferracute Machine Co., Bridgeton, N. J.
Globe Machine & Stamping Co., Cleveland, O.
Jones & Lamson Machine Co., Springfield, Vt.
Long & Allstatter Co., Hamilton, O.
Marchant, Geo. F., Chicago, Ill.
Ryerson, Joseph T., & Son, Chicago, Ill.
Scully Steel & Iron Co., Chicago, Ill.
Toledo Machine & Tool Co., Toledo, O.
Wheeling Mold & Fdry. Co., Wheeling, W. Va.

Dies (Forging).

Cleveland Die & Mfg. Co., Cleveland, O.

Dies (Stamping).

Cleveland Die & Mfg. Co., Cleveland, O.

Dies (Thread Rolling).

Cleveland Die & Mfg. Co., Cleveland, O.

Dredges.

Bucyrus Co., South Milwaukee, Wis.
Marion Steam Shovel Co., Marion, O.
Thew Automatic Shovel Co., Lorain, O.

Dressers (Emery Wheel).

Abrasive Material Co., Philadelphia, Pa.
Carborundum Co., Niagara Falls, N. Y.
Chicago Screw Co., Chicago, Ill.
Cole, J. Wendell, Columbus, O.
Norton Co., Worcester, Mass.
Stow Mfg. Co., Binghamton, N. Y.

Drills.

Baird Machinery Co., Pittsburg, Pa.
Baker Bros., Toledo, O.
Celfor Tool Co., Chicago, Ill.
Cincinnati Iron Store Co., Cincinnati, O.
Cincinnati Machine Tool Co., Cincinnati, O.
Cleveland Punch & Shear Works Co., Cleveland, O.
Davis Machine Co., W. P., Rochester, N. Y.
Marshall & Huschart Machinery Co., Chicago.
McCabe, J. J., New York City.
Motch & Merryweather Machinery Co., Cleveland, O.
Niles-Bement-Pond Co., New York City.
Ryerson, Joseph T., & Son, Chicago, Ill.
Scully Steel & Iron Co., Chicago, Ill.
Vandyck Churchill Co., New York City.
Wickes Bros., Pittsburg, Pa.

Drills (Electrical).

Cincinnati Electrical Tool Co., Cincinnati, O.

Drills (Pneumatic).

Allen, John F., New York City.
Cleveland Pneumatic Tool Co., Cleveland, O.
Ryerson, Joseph T., & Son, Chicago, Ill.

Drills (Portable).

Bickford Drill & Tool Co., Cincinnati, O.
Niles-Bement-Pond Co., New York City.
Stow Mfg. Co., Binghamton, N. Y.

Drills (Twist).

Scully Steel & Iron Co., Chicago, Ill.

Drivers (Pile).

Bucyrus Co., South Milwaukee, Wis.
Industrial Works, Bay City, Mich.
McMyler Mfg. Co., Cleveland, O.

Dynamos.

General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., Pittsburg, Pa.

Economizers (Fuel).

Green Fuel Economizer Co., Matteawan, N. Y.

Elevators.

Jeffrey Mfg. Co., Columbus, O.
Kenworthy Engineering Co., Waterbury, Conn.
McLanahan-Stone Machine Co., Hollidaysburg.

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Ductility Of Wrought Iron **Accuracy** of Drop Forgings **Strength** of Cast Steel

Up to the Full Limit of Malleable Cast Iron Possibilities.

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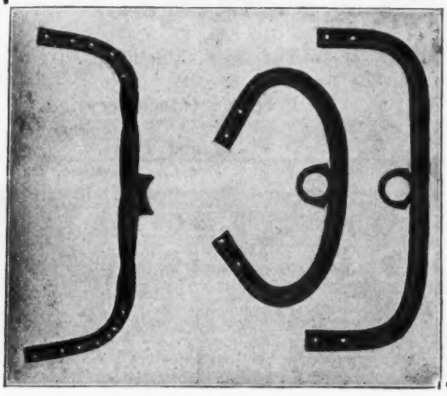

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This Iron was Bent and Twisted Cold.

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Meadville, Pa.

Malleable Castings of any description

Satisfaction guaranteed

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Ridgway & Son, Craig, Coatesville, Pa.
Whiting Foundry Equipment Co., Harvey, Ill.

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Bellefontaine Bridge & Steel Co., Bellefontaine, O.
Bucyrus Steel Casting Co., Bucyrus, O.
Canton Boiler & Engineering Co., Canton, O.
Chambersburg Engineering Co., Chambersburg.
Chaplin-Fulton Mfg. Co., Pittsburg, Pa.
Duff Patents Co., Pittsburg, Pa.
Eichleay Co., John Jr., Pittsburg, Pa.
Eynon-Evans Mfg. Co., Philadelphia, Pa.
Garrett-Cromwell Engineering Co., Cleveland,O.
Hunt & Co., Robert W., Chicago, Ill.
Jeffrey Mfg. Co., Columbus, O.
Kennedy, Julian, Pittsburg, Pa.
Kennedy, Walter, Pittsburg, Pa.
Kenworthy Engineering Co., Waterbury, Conn.
Ladd & Baker, Philadelphia, Pa.
Lake Erie Engineering Works, Buffalo, N. Y.
Lamond & Son, David, Pittsburg, Pa.
Laughlin & Co., Alex., Pittsburg, Pa.
Macbeth Iron Co., Cleveland, O.
McClintic-Marshall Construction Co., Pittsburg, Pa.
McClure, Son & Co., George W., Pittsburg,Pa.
McKee, Arthur G., Cleveland, O.
Meehan Boiler & Construction Co., Lowellville, O.
Morgan Engineering Co., Alliance, O.
Peck & Co., Francis J., Cleveland, O.
Pittsburg Construction Co., Pittsburg, Pa.
Phoenix Iron Works Co., Meadville, Pa.
Pittsburg Valve, Foundry & Construction Co., Pittsburg, Pa.
Riter-Conley Mfg. Co., Pittsburg, Pa.
Scaife & Sons Co., Wm. B., Pittsburg, Pa.
Seaver, John W., Cleveland, O.
Smythe Co., S. R., Pittsburg, Pa.
Swindell & Bros., Wm., Pittsburg, Pa.
Union Foundry & Machine Co., Pittsburg, Pa.
United Engineering & Fdy. Co., Pittsburg, Pa.
Wellman-Seaver-Morgan Co., Cleveland, O.

Engines (Automatic).

Erie Engine Works, Erie, Pa.

Engines (Gas and Gasoline).

Buckeye Engine Co., Salem, O.
Chicago House Wrecking Co., Chicago, Ill.
Mesta Machine Co., Pittsburg, Pa.
Struthers-Wells Co., Warren, Pa.
Tod Co., Wm., Youngstown, O.

Engines (Hoisting).

Brown Hoisting Machinery Co., Cleveland, O.
Dake Engine Co., Grand Haven, Mich.
Detroit Hoist & Machine Co., Detroit, Mich.
Erie Engine Works, Erie, Pa.
Flory Mfg. Co., S., Bangor, Pa.
Lidgerwood Mfg. Co., New York City.
Mesta Machine Co., Pittsburg, Pa.
New Jersey Foundry & Machine Co., New York City.
Wisconsin Engine Co., Corliss, Wis.

Engines (Pneumatic).

Chicago House Wrecking Co., Chicago, Ill.
Dake Engine Co., Grand Haven, Mich.
Detroit Hoist & Machine Co., Detroit, Mich.

Engines (Portable).

Erie Engine Works, Erie, Pa.

Engines (Steam).

Ball Engine Co. Erie, Pa.
Buckeye Engine Co., Salem, O.
Chicago House Wrecking Co., Chicago, Ill.
Columbus Iron & Steel Co., Columbus, O.
Cooper Co., C. & G., Mt. Vernon, O.
Dake Engine Co., Grand Haven, Mich.
Davis Machine Co., W. P., Rochester, N. Y.
Dravo, Doyle & Co., Pittsburg, Pa.
Erie Engine Works, Erie, Pa.
Flynn Machinery Co., Wm. H., Cincinnati, O.
Lake Erie Engineering Works, Buffalo, N. Y.
Lidgerwood Mfg. Co., New York City.
Macbeth Iron Co., Cleveland, O.
Mackintosh, Hemphill & Co., Pittsburg, Pa.
Mesta Machine Co., Pittsburg, Pa.
New Britain Machine Co., New Britain, Conn.
Phoenix Iron Works Co., Meadville, Pa.
Randle Machinery Co., Cincinnati, O.
Southwark Foundry & Machine Co., Philadelphia, Pa.
Struthers-Wells Co., Warren, Pa.
Tod Co., Wm., Youngstown, O.
Wellman-Seaver-Morgan Co., Cleveland, O.
Wickes Bros., Pittsburg, Pa.
Wisconsin Engine Co., Corliss, Wis.

Equipment and Supplies (Foundry).

Hill & Griffith Co., Cincinnati, O.
New England Engineering & Equipment Co., Boston, Mass.
Obermayer, S., Co., Cincinnati, O.
Paxson Co., J. W., Philadelphia, Pa.
Smith Fdry. Supply Co., J. D., Cleveland, O.
Stevens, F. B., Detroit, Mich.
Whiting Foundry Equipment Co., Harvey, Ill.

Equipment (Gas Producer Power Plants).

Morgan Construction Co., Worcester, Mass.

Equipment (Power Transmission).

General Electric Co., Schenectady, N. Y.
Jeffrey Mfg. Co., Columbus, O.
Jones & Laughlin Steel Co., Pittsburg, Pa.
Westinghouse Electric & Mfg.Co., Pittsburg,Pa.

Extractors (Steam or Oil).

Austin Separator Co., Detroit, Mich.
Cole, J. Wendell, Columbus, O.
Dravo, Doyle & Co., Pittsburg, Pa.
Harrison Safety Boiler Works, Philadelphia, Pa.
Squires Steam Specialties.
Strong, Carlisle & Hammond Co., Cleveland,O.
Wright Mfg. Co., Detroit, Mich.

Facings (Foundry).

Dixon Crucible Co., Joseph, Jersey City, N. J.
Hill & Griffith Co., Cincinnati, O.
Obermayer, S., Co., Cincinnati, O.
Smith Fdry. Supply Co., J. D., Cleveland, O.
Stevens, F. B., Detroit, Mich.

Facings (Sea Coal).

Obermayer, S., Co., Cincinnati, O.
Smith Fdry. Supply Co., J. D., Cleveland, O.

Ferro-Manganese.

Blackwell & Sons Co., Ltd., Geo. G., Liverpool, Eng.
Rogers, Brown, & Co., Cincinnati, O.

Ferro-Silicon.

Blackwell & Sons Co., Ltd., Geo. G., Liverpool, Eng.
Roessler-Hasslacher Chemical Co., New York.
Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.

Files.

Barnett, G. & H., Co., Philadelphia, Pa.
Nicholson File Co., Providence, R. I.

Filler (Iron).

Obermayer, S., Co., Cincinnati, O.

Fillet (Leather and Wood).

Cleveland Fillet Co., Cleveland, O.
Cleveland Galvanizing Works, Cleveland, O.

Filters (Water or Oil).

Harrison Safety Boiler Works, Philadelphia, Pa.
Scaife & Sons Co., Wm. B., Pittsburg, Pa.
Wright Mfg. Co., Detroit, Mich.

Fire Escapes.

Warren Construction Co., Warren, O.

Fittings (Open Hearth Steel Pipe)

United Engineering & Fdy. Co., Pittsburg, Pa.

Fittings (Pipe).

Flagg & Co., Stanley G., Philadelphia, Pa.
Pittsburg Valve, Foundry & Construction Co., Pittsburg, Pa.

Flasks.

Hill & Griffith Co., Cincinnati, O.
Obermayer, S., Co., Cincinnati, O.

Flour (Foundry).

Hill & Griffith Co., Cincinnati, O.
Obermayer, S., Co., Cincinnati, O.
Smith Fdry. Supply Co., J. D., Cleveland, O.

Forges (Bolt and Rivet Heating).

Kenworthy Engineering Co., Waterbury, Conn.

Forgings.

American Iron & Steel Mfg. Co., Lebanon, Pa.
Bliss Co., E. W., Brooklyn, N. Y.
Clapp Mfg. Co., E. D., Auburn, N. Y.
Cleveland City Forge & Iron Co., Cleveland, O.
Cleveland Punch & Shear Works Co., Cleveland, O.
Columbus Forge & Iron Co., Columbus, O.
Crucible Steel Forge Co., Cleveland, O.
Dyson & Son, Jos., Cleveland, O.
Erie Forge Co., Erie, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Hathaway & Co., A. G., Cleveland, O.
Heppenstall Forge & Knife Co., Pittsburg, Pa.
Jones & Laughlin Steel Co., Pittsburg, Pa.
Mesta Machine Co., Pittsburg, Pa.
Ohio Forge Co., Cleveland, O.
Otis Steel Co., Cleveland, O.
Toledo Machine & Tool Co., Toledo, O.

Forgings (Auto).

Ohio Forge Co., Cleveland, O.

Forgings (Copper and Alloy Steel).

Anderson Forge & Machine Co., Detroit, Mich.
Chicago Drop Forge & Foundry Co., Kensington, Ill.
Park Drop Forge Co., Cleveland, O.
Transue & Williams Co., Alliance, O.
Wyman & Gordon, Cleveland, O.

Forgings (Car and Locomotive).

American Iron & Steel Mfg. Co., Lebanon, Pa.
Anderson Forge & Machine Co., Detroit, Mich.
Chicago Drop Forge & Foundry Co., Kensington, Ill.
Clapp Mfg. Co., E. D., Auburn, N. Y.
Cleveland City Forge & Iron Co., Cleveland, O.
Columbus Forge & Iron Co., Columbus, O.
Heppenstall Forge & Knife Co., Pittsburg, Pa.
Toledo Machine & Tool Co., Toledo, O.
Transue & Williams Co., Alliance, O.

Forgings (Drop).

Anderson Forge & Machine Co., Detroit, Mich.
Canton Drop Forging & Mfg. Co., Canton, O.
Chicago Drop Forge & Foundry Co., Kensington, Ill.
Consolidated Mfg. Co., Toledo, O.
Park Drop Forge Co., Cleveland, O.
Transue & Williams Co., Alliance, O.
Wyman & Gordon Co., Cleveland, O., and Worcester, Mass.

Forgings (Engine).

Erie Forge Co., Erie, Pa.

Forgings (Machined).

Erie Forge Co., Erie, Pa.

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Kennedy, Walter, Pittsburg, Pa.
Ladd & Baker, Philadelphia, Pa.
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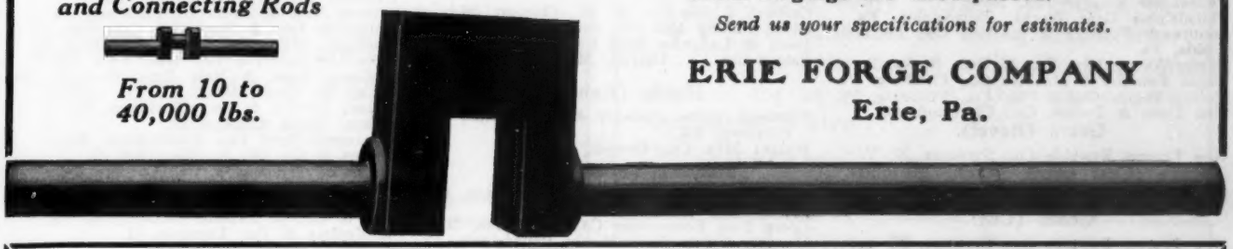

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Ganschow Co., Wm., Chicago, Ill.
Horsburgh & Scott Co., Cleveland, O.
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Palmer-Bee Co., Detroit, Mich.
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Southwark Foundry & Machine Co., Philadelphia, Pa.
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Strong, Carlisle & Hammond Co., Cleveland, O.
Squires Steam Specialties.
Wood & Co., R. D., Philadelphia, Pa.

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Hill & Griffith Co., Cincinnati, O.
Obermayer, S., Co., Cincinnati, O.
Smith Fdry. Supply Co., J. D., Cleveland, O.

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Green Engineering Co., Chicago, Ill.
Lake Erie Engineering Works, Buffalo, N. Y.
Macbeth Iron Co., Cleveland, O.
Vulcan Iron Works Co., Toledo, O.

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Bradley & Son, C. C., Syracuse, N. Y.

Hammers (Drop).

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American Tube & Stamping Co., Bridgeport.
Bliss, E. W., Co., Brooklyn, N. Y.
Chambersburg Engineering Co., Chambersburg.
Heppenstall Forge & Knife Co., Pittsburg, Pa.
Merrill Bros., Brooklyn, N. Y.
Michigan Mach. & Mfg. Co., Ypsilanti, Mich.
Morgan Engineering Co., Alliance, O.
Niles-Bement-Pond Co., New York City.
Toledo Machine & Tool Co., Toledo, O.
Waterbury Farrel Fdy. & Mch. Co., Waterbury, Conn.
Wickes Bros., Pittsburg, Pa.
Williams, White & Co., Moline, Ill.

Hammers (Helve).

Lingle, J. H., Bellefonte, Pa.

Hammers (Pneumatic).

Bliss Co., E. W., Brooklyn, N. Y.
Cleveland Pneumatic Tool Co., Cleveland, O.
Ryerson, Joseph T., & Son, Chicago, Ill.
Scully Steel & Iron Co., Chicago, Ill.
Shepard Electric Crane & Hoist Co., Montour Falls, N. Y.

Hammers (Power).

Alliance Machine Co., Alliance, O.
Beaudry & Co., Inc., Boston, Mass.
Bliss Co., E. W., Brooklyn, N. Y.
Bradley & Sons, C. C., Syracuse, N. Y.
Buffalo Fdy. & Mch. Co., Buffalo, N. Y.
Chambersburg Engineering Co., Chambersburg.
Cleveland Punch & Shear Works, Cleveland, O.
Morgan Engineering Co., Alliance, O.
Niles-Bement-Pond Co., New York City.
Toledo Mch. & Tool Co., Toledo, O.
Waterbury Farrel Fdy. & Mch. Co., Waterbury, Conn.
Williams, White & Co., Moline, Ill.

Hammers (Steam).

Alliance Machine Co., Alliance, O.
Bethlehem Steel Co., So. Bethlehem, Pa.
Buffalo Fdy. & Mch. Co., Buffalo, N. Y.
Chambersburg Engineering Co., Chambersburg.
Mesta Machine Co., Pittsburg, Pa.
Morgan Engineering Co., Alliance, O.
Niles-Bement-Pond Co., New York City.

Hangers.

Caldwell & Son Co., H. W., Chicago, Ill.
Globe Rolling Mill Co., Cincinnati, O.
Jones & Laughlin Steel Co., Pittsburg, Pa.
Palmer-Bee Co., Detroit, Mich.

Heads (Exhaust).

Pittsburg Valve, Foundry & Construction Co., Pittsburg, Pa.
Wright Mfg. Co., Detroit, Mich.

Heaters (Feed Water).

Canton Boiler & Engineering Co., Canton, O.
Erie Engine Works, Erie, Pa.
Green Fuel Economizer Co., Matteawan, N. Y.
Harrison Safety Boiler Works, Philadelphia, Pa.
McGowan Co., John H., Cincinnati, O.
Petroleum Iron Works Co., Sharon, Pa.
Phoenix Iron Works Co., Meadville, Pa.

Hoists (Chain).

Brown Hoisting Machinery Co., Cleveland, O.
Chisholm & Moore Mfg. Co., Cleveland, O.
Cleveland Crane & Car Co., Cleveland, O.
Dake Engine Co., Grand Haven, Mich.
Detroit Hoist & Machine Co., Detroit, Mich.
New Jersey Foundry & Machine Co., New York City.
Northern Engineering Works, Detroit, Mich.
Pawling & Harnischfeger, Milwaukee, Wis.

Hoists (Electric).

Alliance Machine Co., Alliance, O.
Brown Hoisting Machinery Co., Cleveland, O.
Case Mfg. Co., Columbus, O.
Cincinnati Iron Store Co., Cincinnati, O.
Cleveland Crane & Car Co., Wickliffe, O.
Cleveland Punch & Shear Co., Cleveland, O.
General Electric Co., Schenectady, N. Y.
Jeffrey Mfg. Co., Columbus, O.
Lidgerwood Mfg. Co., New York City.
McMyler Mfg. Co., Cleveland, O.
Morgan Engineering Co., Alliance, O.
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Northern Engineering Works, Detroit, Mich.
Pawling & Harnischfeger, Milwaukee, Wis.
Shepard Electric Crane & Hoist Co., Montour Falls, N. Y.
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Hoists (Hand).

Case Mfg. Co., Columbus, O.
Cleveland Crane & Car Co., Wickliffe, O.
Chisholm & Moore Mfg. Co., Cleveland, O.
Moyer Tramrail Co., Harvey, Ill.
New Jersey Fdy. & Mch. Co., New York City.
Pawling & Harnischfeger, Milwaukee, Wis.

Hoists (Pneumatic).

Brown Hoisting Machinery Co., Cleveland, O.
Curtis & Co. Mfg. Co., St. Louis, Mo.
Dake Engine Co., Grand Haven, Mich.
Detroit Hoist & Mch. Co., Detroit, Mich.
Moyer Tramrail Co., Harvey, Ill.
Northern Engineering Works, Detroit, Mich.
Shepard Electric Crane & Hoist Co., Montour Falls, N. Y.
Whiting Foundry Equipment Co., Harvey, Ill.

Holders (Tool).

Armstrong Bros. Tool Co., Chicago, Ill.
Bardons & Oliver, Cleveland, O.
Cole, J. Wendell, Columbus, O.

Hoops (Steel).

American Steel & Wire Co., Cleveland, O.
American Tube & Stamping Co., Bridgeport.
Carnegie Steel Co., Pittsburg, Pa.
Cincinnati Iron Store Co., Cincinnati, O.
Jones & Laughlin Steel Co., Pittsburg, Pa.
Pittsburg Steel Co., Pittsburg, Pa.
Ryerson, Joseph T., & Son, Chicago, Ill.
Scully Steel & Iron Co., Chicago, Ill.
Youngstown Sheet & Tube Co., Youngstown, O.

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Cleveland Pneumatic Tool Co., Cleveland, O.

Indicators (Revolution).

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Uehling Instrument Co., Passaic, N. J.

Injectors.

Eynon-Evans Mfg. Co., Philadelphia, Pa.
Jenkins Bros., New York City.
Powell Co., Cincinnati, O.
Randle Machinery Co., Cincinnati, O.
Watson, N. A., Erie, Pa.

Iron (Forging).

Clinton Iron & Steel Co., Pittsburg, Pa.
Globe Rolling Mill Co., Cincinnati, O.

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Blair & Co., Reed F., Pittsburg, Pa.
Bourne-Fuller Co., Cleveland, O.
Carnegie Steel Co., Pittsburg, Pa.
Clinton Iron & Steel Co., Pittsburg, Pa.
Columbus Iron & Steel Co., Columbus, O.
Corrigan, McKinney & Co., Cleveland, O.
Debevoise-Anderson Co., New York City.
DeCamp Bros. & Yule Iron, Coal & Coke Co., St. Louis, Mo.
Eaton, Rhodes & Co., Cincinnati, O.
Evans, David, Chicago, Ill.
Hammond Byrd Co., Birmingham, Ala.
Hanna & Co., M. A., Cleveland, O.
Hickman, Williams & Co., Chicago, Ill.
Hillman & Son, J. H., Pittsburg, Pa.
LaBelle Iron Works, Steubenville, O.
Lea & Co., J. Tatnall, Philadelphia, Pa.
McKeefrey & Co., Leetonia, O.
Mitchell Diggins Iron Co., Cadillac, Mich.
Mudge, Edmund W., & Co., Pittsburg, Pa.
Pickands, Brown & Co., Chicago, Ill.
Pickands, Mather & Co., Cleveland, O.
Republic Iron & Steel Co., Pittsburg, Pa.
Rogers, Brown & Co., Cincinnati, O.
Shenango Furnace Co., Pittsburg, Pa.
Stevens, F. B., Detroit, Mich.
Stewart Iron Co., Cleveland, O.
Superior Charcoal Iron Co., Grand Rapids, Mich.
Tennessee Coal, Iron & Railroad Co., Pittsburg, Pa.
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Empire Iron & Steel Co., Niles, O.
Globe Rolling Mill Co., Cincinnati, O.
Inland Steel Co., Chicago, Ill.
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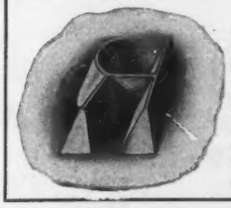

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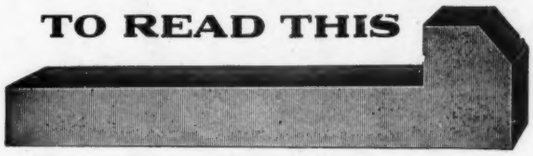
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Niles-Bement-Pond Co., New York City.
Schumacher & Boye, Cincinnati, O.
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Wickes Bros., Pittsburg, Pa.
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Machinery (Automatic Gear Cutting).

Motch & Merryweather Machy. Co., Cleveland, O.

Machinery (Automatic Screw).

Bardons & Oliver, Cleveland, O.

Machinery (Band Saw Filing).

New Britain Machine Co., New Britain, Conn.

Machinery (Bending and Straightening).

Bertsch & Co., Cambridge City, Ind.
Birdsboro Steel Fdy. & Mch. Co., Birdsboro.
Bliss Co., E. W., Brooklyn, N. Y.
Chambersburg Engineering Co., Chambersburg.
Cincinnati Iron Store Co., Cincinnati, O.
Cleveland Punch & Shear Works Co., Cleveland, O.
Espen-Lucas Mach. Works, Philadelphia, Pa.
Long & Allstatter Co., Hamilton, O.
Morgan Engineering Co., Alliance, O.
Niles-Bement-Pond Co., New York City.
Ryerson, Joseph T., & Son, Chicago, Ill.
Stoever Foundry & Mfg. Co., Myerstown, Pa.
Toledo Mach. & Tool Co., Toledo, O.
United Engrg. & Fdry. Co., Pittsburg, Pa.
Watson-Stillman Co., New York City.
Wickes Bros., Pittsburg, Pa.
Williams, White & Co., Moline, Ill.
Youngstown Fdry. & Mch. Co., Youngstown.

Machinery (Blue Printing).

Buckeye Engine Co., Salem, O.
Youngstown Car Mfg. Co., Youngstown, O.

Machinery (Bolt and Nut).

Acme Mach. Co., Cleveland, O.
Baird Mach. Co., Pittsburg, Pa.
Davis Mach. Co., W. P., Rochester, N. Y.
National Mach. Co., Tiffin, O.
Niles-Bement-Pond Co., New York City.
Standard Engineering Co., Ellwood City, Pa.
Waterbury Farrel Fdy. & Mch. Co., Waterbury, Conn.
Williams Tool Co., Erie, Pa.
Williams, White & Co., Moline, Ill.

Machinery (Boring and Turning).

Baker Bros., Toledo, O.
Bickford Drill & Tool Co., Cincinnati, O.
Espen-Lucas Mach. Works, Philadelphia, Pa.
McCabe, J. J., New York City.
Motch & Merryweather Machy. Co., Cleveland, O.
Niles-Bement-Pond Co., New York City.
Warner & Swasey Co., Cleveland, O.

Machinery (Chain Making, Cable).

Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

Machinery (Core) (Foundry).

Smith Fdry. Supply Co., J. D., Cleveland, O.
Tabor Mfg. Co., Philadelphia, O.

Machinery (Crushing).

Bartlett & Snow Co., C. O., Cleveland, O.
Birdsboro Steel Foundry & Mach. Co., Birdsboro, Pa.
Farrell Foundry & Mach. Co., Ansonia, Conn.
Hogg Iron & Steel Foundry Co., Geo. A., Pittsburg, Pa.
Jeffrey Mfg. Co., Columbus, O.
Wellman-Seaver-Morgan Co., Cleveland, O.

Machinery (Cutting Off) (Cold Metal).

Bignall & Keeler Mfg. Co., Edwardsville, Ill.
Birdsboro Steel Foundry & Mach. Co., Birdsboro, Pa.
Cleveland Punch & Shear Works Co., Cleveland, O.
Davis Machine Co., W. P., Rochester, N. Y.
Espen-Lucas Machine Works, Philadelphia, Pa.
Niles-Bement-Pond Co., New York City.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.

Machinery (Elevating and Conveying).

Bartlett & Snow Co., C. O., Cleveland, O.
Brown Hoisting Machinery Co., Cleveland, O.
Flory Mfg. Co., S., Bangor, Pa.
Interstate Engineering Co., Bedford, O.
Jeffrey Mfg. Co., Columbus, O.
Lidgerwood Mfg. Co., New York City.
McMyler Mfg. Co., Cleveland, O.
New Jersey Foundry & Mach. Co., New York
Palmer-Bee Co., Detroit, Mich.
Wellman-Seaver-Morgan Co., Cleveland, O.
Whiting Foundry Equipment Co., Harvey, Ill.

Machinery (Forging).

Acme Mach. Co., Cleveland, O.
Bliss Co., E. W., Brooklyn, N. Y.
Chambersburg Engineering Co., Chambersburg.
Ferracute Machine Co., Bridgeton, N. J.
Merrill Bros., Brooklyn, N. Y.
Morgan Engineering Co., Alliance, O.
National Mach. Co., Tiffin, O.
Niles-Bement-Pond Co., New York City.
Toledo Mach. & Tool Co., Toledo, O.
Waterbury Farrel Fdy. & Mch. Co., Waterbury, Conn.
Williams, White & Co., Moline, Ill.

Machinery (Galvanizing).

Kenworthy Engineering Co., Waterbury, Conn.
United Engineering & Fdy. Co., Pittsburg, Pa.

Machinery (Gear Cutting).

Cincinnati Shaper Co., Cincinnati, O.

Machinery (Grinding).

Cleveland Pneumatic Tool Co., Cleveland, O.
Cole, J. Wendell, Columbus, O.
Davis Machine Co., W. P., Rochester, N. Y.
Landis Tool Co., Waynesboro, Pa.
Motch & Merryweather Machy. Co., Cleveland, O.
Stow Mfg. Co., Binghamton, N. Y.

Machinery (Hydraulic).

Bethlehem Steel Co., So. Bethlehem, Pa.
United Engineering & Fdy. Co., Pittsburg, Pa.
Waterbury Farrel Fdy. & Mch. Co., Waterbury, Conn.

Machinery (Milling).

Cincinnati Milling Mach. Co., Cincinnati, O.
Davis Mach. Co., W. P., Rochester, N. Y.
Espen-Lucas Mach. Works, Philadelphia, Pa.
Foote Bros. Gear & Mach. Co., Chicago, Ill.
LeBlond Mach. Tool Co., R. K., Cincinnati, O.
McCabe, J. J., New York City.
Motch & Merryweather Machinery Co., Cleveland, O.
Niles-Bement-Pond Co., New York City.
Vandyck Churchill Co., New York City.
Warner & Swasey Co., Cleveland, O.

Machinery (Mining).

Birdsboro Steel Foundry & Mach. Co., Birdsboro, Pa.
Farrel Foundry & Mach. Co., Ansonia, Conn.
Interstate Engineering Co., Bedford, O.
Jeffrey Mfg. Co., Columbus, O.
Lake Erie Engineering Works, Buffalo, N. Y.
Lake Shore Engine Works, Marquette, Mich.
Lidgerwood Mfg. Co., New York City.
Marion Steam Shovel Co., Marion, O.
McLanahan-Stone Machine Co., Hollidaysburg.
Prescott Steam Pump Works, Fred M., Milwaukee, Wis.
Union Foundry & Machine Co., Pittsburg, Pa.
Thew Automobile Shovel Co., Lorain, O.
United Iron Works Co., Joplin, Mo.
Wellman-Seaver-Morgan Co., Cleveland, O.
Wisconsin Engine Co., Corliss, Wis.

Machinery (Molding).

New England Eng. & Equipment Co., Boston, Mass.
Obermayer, S., Co., Cincinnati, O.
Pridmore, Henry E., Chicago, Ill.
Smith Fdry. Supply Co., J. D., Cleveland, O.
Tabor Mfg. Co., Philadelphia, Pa.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.

Machinery (Pipe Mill).

Acme Machinery Co., Cleveland, O.
Bignall & Keeler Mfg. Co., Edwardsville, Ill.
National Machinery Co., Tiffin, O.
Niles-Bement-Pond Co., New York City.
Standard Engineering Co., Ellwood City, Pa.
Stoever Foundry & Mfg. Co., Myerstown, Pa.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.
United Engineering & Fdy. Co., Pittsburg, Pa.
Williams Tool Co., Erie, Pa.

Machinery (Rolling Mill).

Alliance Machine Co., Alliance, O.
Bertsch & Co., Cambridge City, Ind.
Birdsboro Steel Foundry & Mach. Co., Birdsboro, Pa.
Farrel Foundry & Mach. Co., Ansonia, Conn.
Hogg Iron & Steel Foundry Co., Geo. A., Pittsburg, Pa.
Kenworthy Engineering Co., Waterbury, Conn.
Lake Erie Engineering Works, Buffalo, N. Y.
Macbeth Iron Co., Cleveland, O.
Mackintosh, Hemphill & Co., Pittsburg, Pa.
Mesta Machine Co., Pittsburg, Pa.
Morgan Construction Co., Worcester, Mass.
Morgan Engineering Co., Alliance, O.
Newbold, R. S., & Son Co., Norristown, Pa.
Standard Engineering Co., Ellwood City, Pa.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.
Union Foundry & Mach. Co., Pittsburg, Pa.
United Engineering & Fdy. Co., Pittsburg, Pa.
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.
Wellman-Seaver-Morgan Co., Cleveland, O.
Wheeling Mold & Foundry Co., Wheeling, W. Va.
Youngstown Foundry & Machine Co., Youngstown, O.

Machinery (Sand Blast).

Obermayer, S., Co., Cincinnati, O.
Paxson Co., J. W., Philadelphia, Pa.
Smith Fdry. Supply Co., J. D., Cleveland, O.

Machinery (Second Hand).

Baird Machinery Co., Pittsburg, Pa.
Chicago House Wrecking Co., Chicago, Ill.
Flynn Machinery Co., Wm. H., Cincinnati, O.
Lodge & Shipley Machine Tool Co., Cincinnati, O.
McCabe, J. J., New York City.
McDowell, Stocker & Co., Chicago, Ill.
Marshall & Huschart Machinery Co., Chicago.
Motch & Merryweather Machinery Co., Cleveland, O.
Niles-Bement-Pond Co., New York City.
Randle Machinery Co., Cincinnati, O.
Stocker Machinery Co., H. A., Chicago, Ill.
Toomey, Frank, Philadelphia, Pa.
Western, R. W., Cleveland, O.
Wickes Bros., Pittsburg, Pa.

Machinery (Shovel).

Bertsch & Co., Cambridge City, Ind.
Toledo Machine & Tool Co., Toledo, O.
Union Foundry & Mach. Co., Pittsburg, Pa.

Machinery (Special).

Alliance Machine Co., Alliance, O.
Bilgram, Hugo, Philadelphia.
Bliss Co., E. W., Brooklyn, N. Y.
Chambersburg Engineering Co., Chambersburg, Pa.
Consolidated Press & Tool Co., Hastings, Mich.
Foote Bros. Gear & Machine Co., Chicago.
Globe Machine & Stamping Co., Cleveland, O.
Hogg Iron & Steel Foundry Co., Pittsburg.
Long & Allstatter Co., Hamilton, O.
Merrill Bros., Brooklyn, N. Y.
Morgan Engineering Co., Alliance, O.
Niles-Bement-Pond Co., New York City.
Standard Engineering Co., Ellwood City, Pa.
Stoever Foundry & Mfg. Co., Myerstown, Pa.
Taylor, Wilson Mfg. Co., McKees Rocks, Pa.
Tod Co., William, Youngstown, O.
Union Foundry & Machine Co., Pittsburg, Pa.
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.
Williams, White & Co., Moline, Ill.

Machinery (Spike and Nail).

National Machinery Co., Tiffin, O.
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

Machinery (Swaging).

Goodyear, S. W., Waterbury, Conn.

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Acme Machinery Co., Cleveland, O.
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Niles-Bement-Pond Co., New York City.
Standard Engineering Co., Ellwood City, Pa.
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Williams, White & Co., Moline, Ill.

Machinery (Thread Rolling).

Acme Machinery Co., Cleveland, O.
Bliss Co., E. W., Brooklyn, N. Y.
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Machinery (Tin House).

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Machinery (Wire Mill, Nail Mill).

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Machinists.

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Magnesite (Dead Burned).

Stowe-Fuller Co., Cleveland, O.

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Electric Controller & Supply Co., Cleveland, O.

Metals (Anti-Friction).

Phosphor Bronze Smelting Co., Philadelphia.

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Phosphor Bronze Smelting Co., Philadelphia.

Mills (Wire Complete Equipment).

Morgan Construction Co., Worcester, Mass.
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

Models (Made to Order).

Balkwill Pattern Works, Cleveland, O.
Cleveland Castings Pattern Co., Cleveland, O.
Cleveland Die & Mfg. Co., Cleveland, O.
Freeman Pattern Co., Toledo, O.
Standard Pattern Co., Cleveland, O.

Molds (Ingot).

Bethlehem Steel Co., So. Bethlehem, Pa.
Carnegie Steel Co., Pittsburg, Pa.
Marshall Foundry Co., Pittsburg, Pa.
Union Foundry & Machine Co., Pittsburg, Pa.
Wheeling Mold & Foundry Co., Wheeling, W. Va.
Youngstown Foundry & Machine Co., Youngstown, Pa.

Motors (Air).

Chisholm & Moore Mfg. Co., Cleveland, O.
Cleveland Pneumatic Tool Co., Cleveland, O.
Dake Engine Co., Grand Haven, Mich.
Detroit Hoist & Machine Co., Detroit, Mich.
Shepard Electric Crane & Hoist Co., Montour Falls, N. Y.
Westinghouse Electric & Mfg. Co., Pittsburg.

Motors (Electric D. C. & A. C.)

Chicago House Wrecking Co., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Stow Mfg. Co., Binghamton, N. Y.
Westinghouse Electric & Mfg. Co., Pittsburg.

Nails.

American Steel & Wire Co., Chicago, Ill.
Jones & Laughlin Steel Co., Pittsburg, Pa.
LaBelle Iron Works, Steubenville, O.
Pittsburg Steel Co., Pittsburg, Pa.

Nuts.

American Bridge Co., New York City.
American Iron & Steel Mfg. Co., Lebanon, Pa.
Cleveland City Forge & Iron Co., Cleveland.
Graham Nut Co., Pittsburg, Pa.
Lockhart Iron & Steel Co., Pittsburg, Pa.
Milton Mfg. Co., Milton, Pa.
National Bolt & Nut Co., Pittsburg, Pa.
Phosphor Bronze Smelting Co., Ltd., Philadelphia, Pa.
Republic Iron & Steel Co., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Ryerson, Joseph T., & Son, Chicago, Ill.
Scully Steel & Iron Co., Chicago, Ill.
Upson Nut Co., Cleveland, O.

Ore (Chrome).

American Refractories Co., Chicago, Ill.
Blackwell & Sons Co., Ltd., Geo. G., Liverpool, England.
Harbison-Walker Refractories Co., Pittsburg.
Stowe-Fuller Co., Cleveland, O.

Ores (Iron).

Blackwell, Sons & Co., Geo. G., Liverpool.
Corrigan, McKinney & Co., Cleveland, O.
Debevoise-Anderson Co., New York City.
Ennis & Co., Philadelphia, Pa.
Hanna & Co., M. A., Cleveland, O.
Hillman & Son, J. H., Pittsburg, Pa.
Lea, J. Tatnall, & Co., Philadelphia, Pa.
Labelle Iron Works, Steubenville, O.
Lake Erie Ore Co., Cleveland, O.
Oglebay, Norton & Co., Cleveland, O.
Pickands, Brown & Co., Chicago, Il.
Pickands, Mather & Co., Cleveland, O.
Tod-Stambaugh Co., Cleveland, O.

Ovens (Core).

Hill & Griffith Co., Cincinnati, O.
Kenworthy Engineering Co., Waterbury, Conn.
Northern Engineering Co., Detroit, Mich.
Obermayer, S., Co., Cincinnati, O.
Paxson Co., J. W., Philadelphia, Pa.
Smith Fdry. Supply Co., J. D., Cleveland, O.
Whiting Foundry Equipment Co., Harvey, Ill.

Packing.

Jenkins Bros., New York City.
Watson-Stillman Co., New York City.

Patterns.

Balkwill Pattern Co., Cleveland, O.
Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.
Cleveland Castings Pattern Co., Cleveland, O.
Freeman Pattern Works, Toledo.
Lake Erie Engineering Works, Buffalo, N. Y.
Macbeth Iron Co., Cleveland, O.
Port Huron Engine & Thresher Co., Port Huron, Mich.
Standard Pattern Works, Cleveland, O.
Walker Foundry Co., Erie, Pa.
Wellman-Seaver-Morgan Co., Cleveland, O.
Youngstown Foundry & Machine Co. Youngstown, O.

Patterns (Metal).

Canton Brass Co., Canton, O.

Penstocks.

Canton Boiler & Engineering Co., Canton, O.
Petroleum Iron Works, Sharon, Pa.
Struthers-Wells Co., Warren, Pa.

Pinions (Rawhide).

New Process Rawhide Co., Syracuse, N. Y.

Pipe.

LaBelle Iron Works, Steubenville, O.
Lake Erie Boiler Works, Buffalo, N Y.
Meehan Boiler & Construction Co., Lowellville, O.
Mudge & Co., Edmund W., Pittsburg, Pa.
National Tube Co., Pittsburg, Pa.
Petroleum Iron Works Co., Sharon, Pa.
Pittsburg Valve, Foundry & Construction Co., Pittsburg, Pa.
Rempe Co., Chicago, Ill.
Riter-Conley Mfg. Co., Pittsburg, Pa.
Struthers-Wells Co., Warren, Pa.
United States Cast Iron Pipe & Foundry Co., New York City.
Youngstown Sheet & Tube Co., Youngstown, O.

Pipe (Riveted Steel).

American Bridge Co., New York City.
Canton Boiler & Engineering Co. Canton, O.
Meehan Boiler & Construction Co., Lowellville, O.
Petroleum Iron Works Co., Sharon, Pa.
Riter-Conley Mfg. Co., Pittsburg, Pa.
Scaife & Sons Co., Wm. B., Pittsburg, Pa.
Standard Boiler & Plate Iron Co., Niles, O.
Struthers-Wells Co., Warren, Pa.

Pipe (Wrought Iron).

Bourne-Fuller Co., Cleveland, O.

Planers.

Cincinnati Iron Store Co., Cincinnati, O.
Cincinnati Shaper Co. Cincinnati, O.
Cleveland Punch & Shear Works, Cleveland.
Davis Machine Co., W. P., Rochester, N. Y.
McCabe, J. J., New York City.
Motch & Merryweather Machine Co., Cleveland, O.
Ryerson, Joseph T., & Son, Chicago, Ill.
Vandyck Churchill Co., New York City.
Wickes Bros., Pittsburg, Pa.

Plants (Water Softening).

Harrison Safety Boiler Works, Philadelphia.
Scaife, Wm. B., & Sons Co., Pittsburg, Pa.

Plate (Tin).

American Sheet & Tin Plate Co., Pittsburg, Pa.
Harvey Co., Arthur C., Boston, Mass.
Taylor Co., N. & G., Philadelphia, Pa.

Plates.

American Sheet & Tin Plate Co., Pittsburg, Pa.
American Tube & Stamping Co., Bridgeport.
Beals & Co., Buffalo, N. Y.
Bourne-Fuller Co., Cleveland, O.
Buffalo Steel Co., Buffalo, N. Y.
Cincinnati Iron Store Co., Cincinnati, O.
Columbia Steel Co., Elyria, O.
Eichleay, Jr., Co., John, Pittsburg, Pa.
Empire Iron & Steel Co., Niles, O.
Inland Steel Co., Chicago, Ill.
Kratzer, W. N., & Co., Pittsburg, Pa.
La Belle Iron Works, Steubenville, O.
Lackawanna Steel Co., New York City.
Mudge, Edmund W., & Co., Pittsburg, Pa.
North Works, Illinois Steel Co., Chicago, Ill.
Otis Steel Co., Cleveland, O.
Petroleum Iron Works Co., Sharon, Pa.
Republic Iron & Steel Co., Chicago, Ill.
Scully Steel & Iron Co., Chicago, Ill.
Seneca Iron & Steel Co., Buffalo, N. Y.
Taylor, N. & G., Co., Philadelphia, Pa.
Tennessee Coal, Iron & Railroad Co., Pittsburg, Pa.
United Steel Co., Cincinnati, O.
Wood, Alan, Iron & Steel Co., Philadelphia.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

Plates (Boiler and Tank).

Globe Rolling Mill Co., Cincinnati, O.
La Belle Iron Works Co., Steubenville, O.
Scully Steel & Iron Co., Chicago, Ill.

Plates (Rapping).

Obermayer, S., Co., Cincinnati, O.
Smith, J. D. Fdry. Supply Co., Cleveland, O.

Plates (Tie).

Lackawanna Steel Co., New York City.
North Works, Illinois Steel Co., Chicago, Ill.

Plumbago.

Dixon, Joseph, Crucible Co., Jersey City.
Hill & Griffith Co., Cincinnati, O.
Obermayer, S., Co., Cincinnati, O.
Paxson, J. W., Co., Philadelphia, Pa.
Smith, J. D., Fdry. Supply Co., Cleveland, O.
Stevens, F. B., Detroit, Mich.

Pots (Galvanizing and Tinning).

Canton Boiler & Engineering Co., Canton, O.
Meehan Boiler Construction Co., Lowellsville, Ohio.

Pots (Melting).

Canton Boiler & Engineering Co., Canton, O.

Presses.

American Tube & Stamping Co., Bridgeport.
Beaudry & Co., Boston, Mass.
Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.
Bliss, E. W., Co., Brooklyn, N. Y.
Chambersburg Engineering Co., Chambersburg.
Cleveland Punch & Shear Co., Cleveland, O.
Consolidated Press & Tool Co., Hastings, Mich.
Farrel Foundry & Machine Co., Ansonia, Conn.
Ferracute Machine Co., Bridgeton, N. J.
Lake Erie Engineering Works, Buffalo, N. Y.
Mackintosh, Hemphill & Co., Pittsburg, Pa.
Mesta Machine Co., Pittsburg, Pa.
Michigan Machinery Mfg. Co., Ypsilanti, Mich.
Morgan Engineering Co., Alliance, O.
National Machinery Co., Tiffin, O.
Niles-Bement-Pond Co., New York City.
Toledo Machine & Tool Co., Toledo, O.
United Engineering & Foundry Co., Pittsburg.
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.
Watson-Stillman Co., New York City.
Williams, White & Co., Moline, Ill.
Wood, R. D., & Co., Philadelphia, Pa.

Presses (Tuyere, Bessemer, Converter).

Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

Producers (Gas).

Duff Patents Co., Pittsburg, Pa.
Eynon-Evans Mfg. Co., Philadelphia, Pa.
Laughlin & Co., Alex., Pittsburg, Pa.
McClure Son & Co., G. W., Pittsburg, Pa.
Morgan Construction Co., Worcester, Mass.
Petroleum Iron Works Co., Washington, Pa.
Smythe Co., S. R., Pittsburg, Pa.
Swindell & Bros., Wm., Pittsburg, Pa.
Wellman-Seaver-Morgan Co., Cleveland, O.
Wood & Co., R. D., Philadelphia, Pa.

Pulleys.

Caldwell & Son Co., H. W., Chicago, Ill.
Globe Rolling Mill Co., Cincinnati, O.
Jones & Laughlin Steel Co., Pittsburg, Pa.
Palmer-Bee Co., Detroit, Mich.

Pumps.

Cameron Steam Pump Works, New York City.
Chicago House Wrecking Co., Chicago, Ill.
Dean Bros. Steam Pump Works, Indianapolis.
Deming Co., Salem, O.
Dravo, Doyle & Co., Pittsburg, Pa.
Lake Erie Engineering Works, Buffalo, N. Y
McGowan, J. H., Co., Cincinnati, O.
Prescott, F. M., Steam Pump Co., Milwaukee, Wis.
Southwark Foundry & Machine Co., Philadelphia, Pa.
Tod, William, Co., Youngstown, O.
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.
Watson-Stillman Co., New York City.
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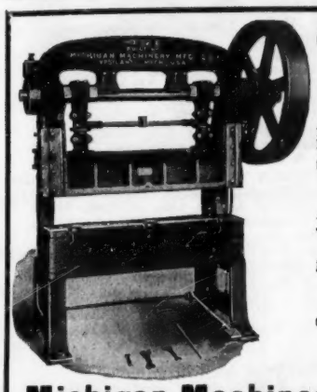

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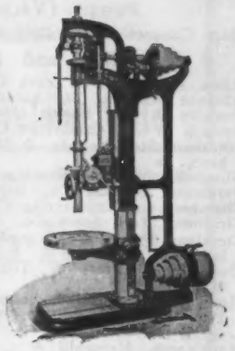

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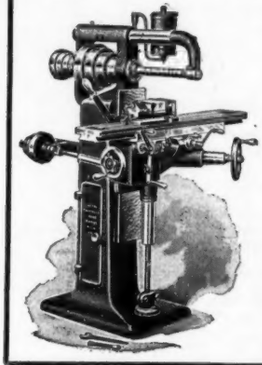

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Empire Iron & Steel Co., Niles, O.
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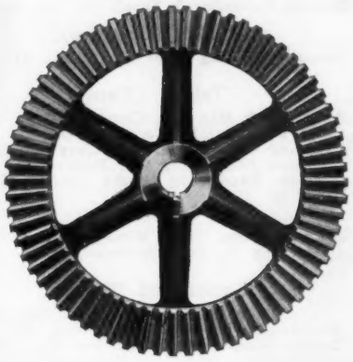

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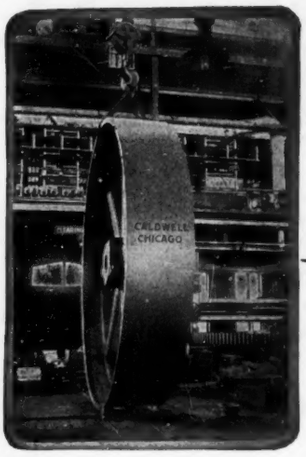

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United Steel Co., Canton, O.
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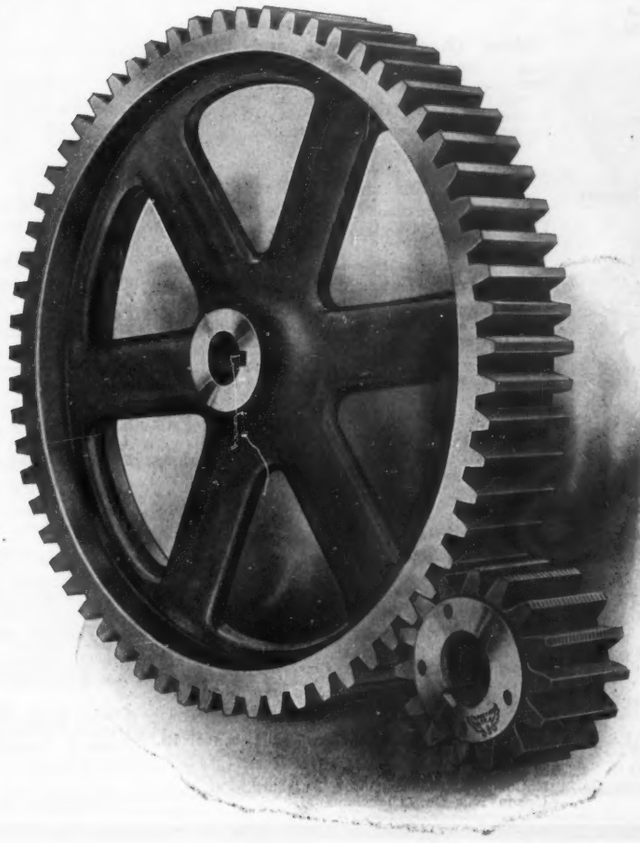

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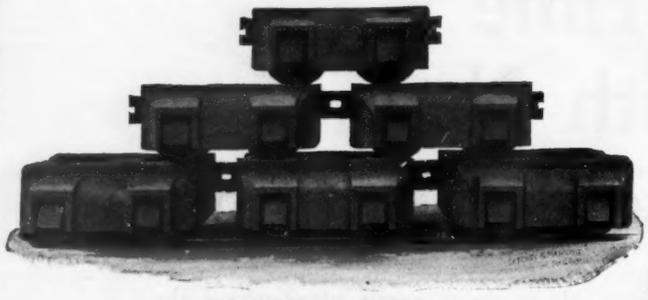

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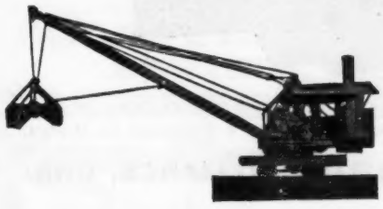

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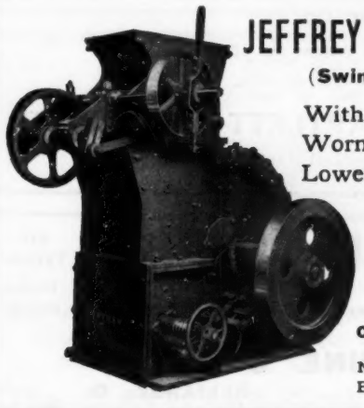

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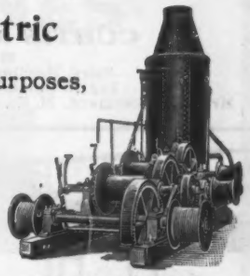

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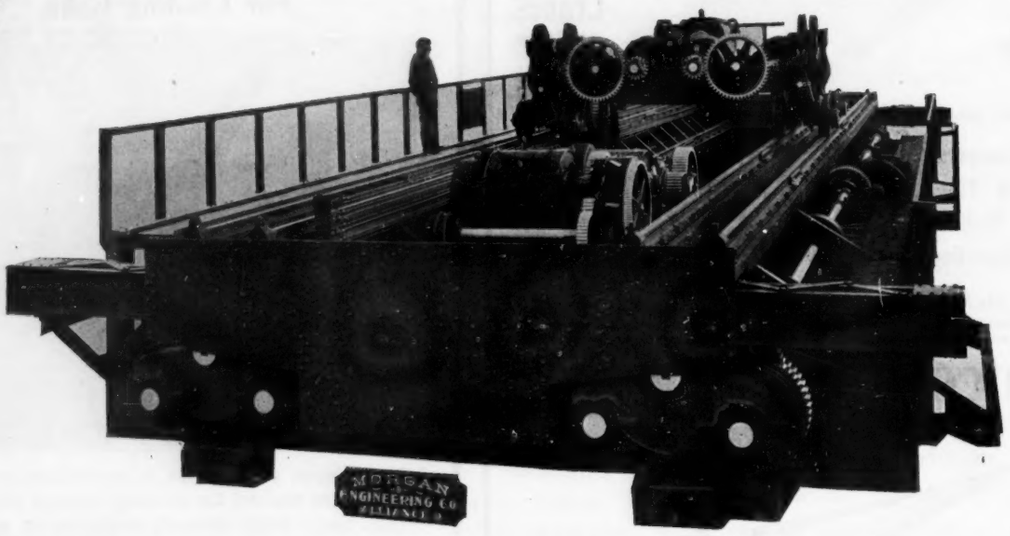

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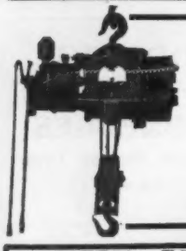

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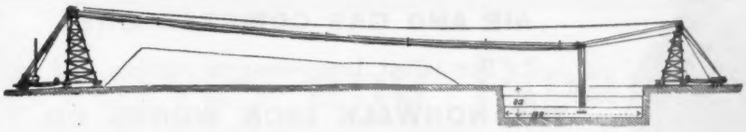

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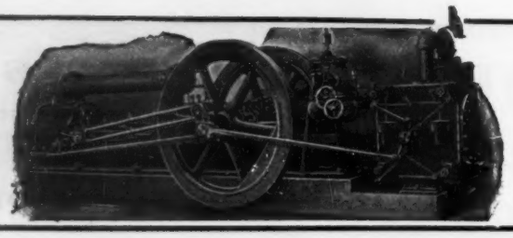

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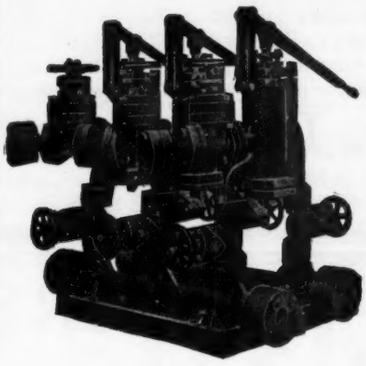

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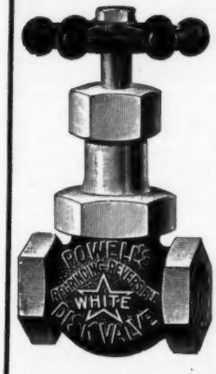

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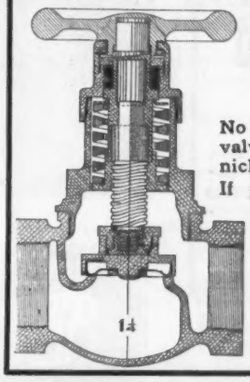

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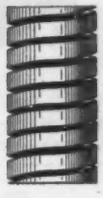

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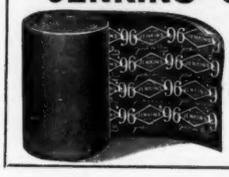

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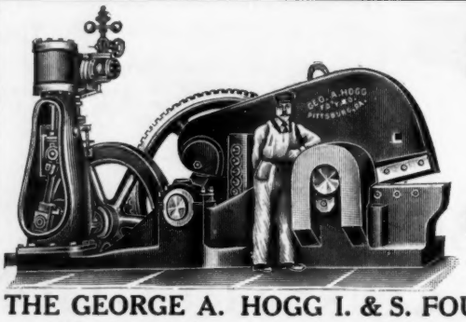

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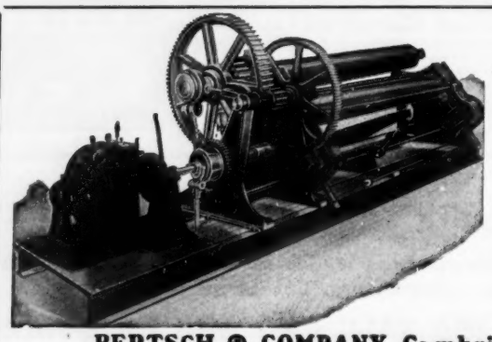

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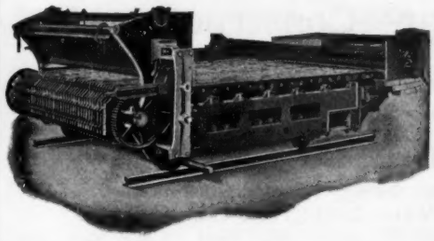

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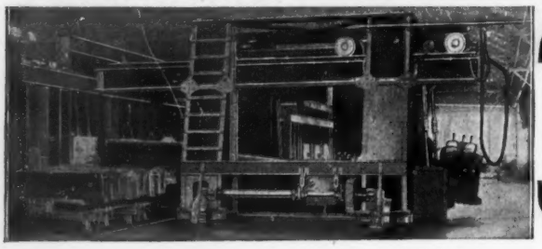

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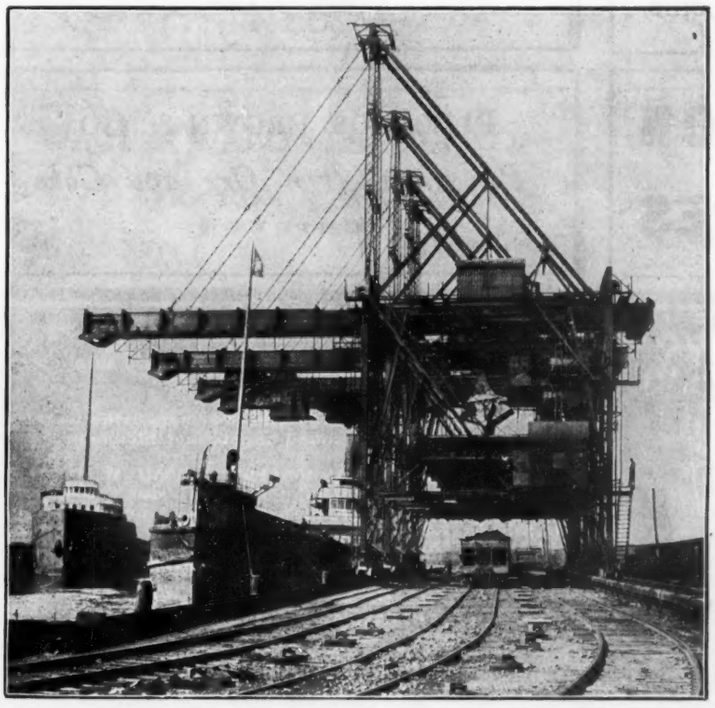

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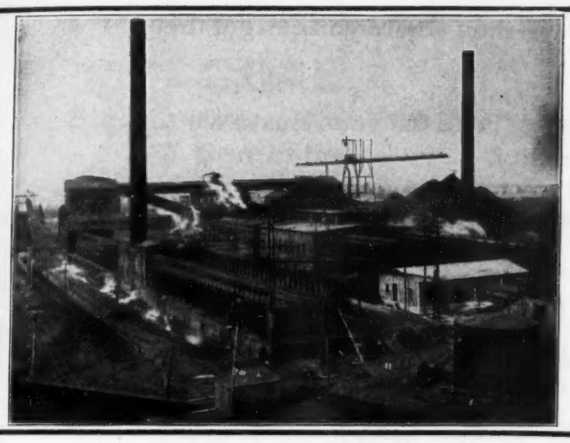

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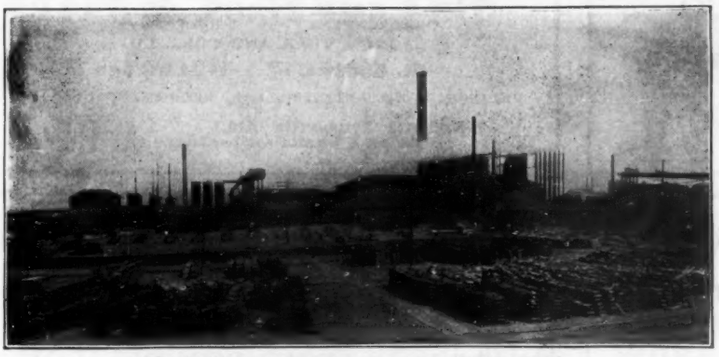

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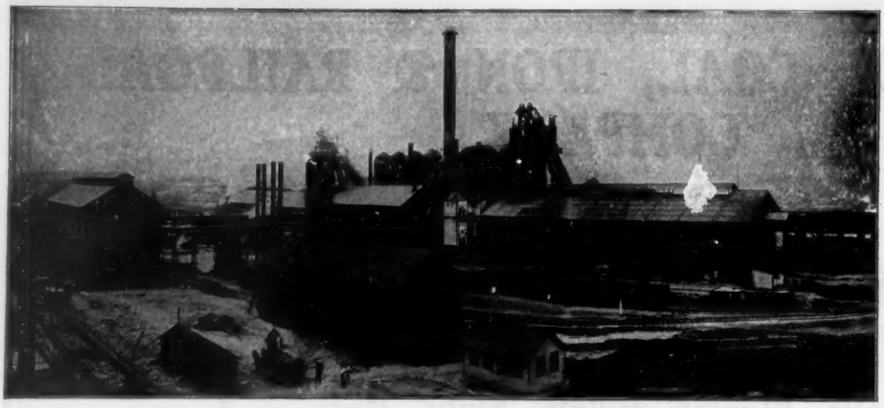

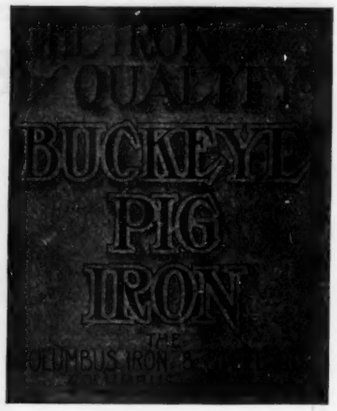

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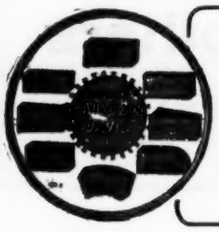

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GAS ENGINE DESIGN

By Charles Edward Lucke, Ph. D.
Mechanical Engineering Department, Columbia University

THE PURPOSE OF THIS BOOK is to present in a compact form those principles which underlie the design of gas engines, together with reliable data for the use of those engaged in building this kind of machinery, and who are familiar with its characteristics. The qualitative or inventive side of design is here entirely omitted, the book being concerned entirely with the quantitative side of design, treating solely of the forces in, and the energy-transforming power of the standard mechanism of, the exploding gas engine.

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WANTED, BY A PLANT EQUIPPED FOR both light and heavy work, to manufacture a machine shop or foundry specialty, either on a royalty basis or to interest ourselves financially in the rights. Box 333, care THE IRON TRADE REVIEW, Cleveland, O.

CANADIAN IRON ORE LANDS FOR sale. Particulars on application. New Ontario Exploration Co., Ltd., Sault Ste. Marie, Ont.

WANTED PARTY WITH A FEW THOUsand dollars to join me in exploring an iron property on the Mesabi iron range. R. B. Higbee, 512 Germania Life Bldg., St. Paul, Minn.

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BLAST FURNACE BLOWING ENGINE

BLAST FURNACE BLOWING ENGINE wanted. One or two second hand blast furnace blowing engines. State maker's name, give dimensions and full particulars, how long been used, when can be inspected. Terms cash. Address B. F. B., care THE IRON TRADE REVIEW, Cleveland, O.

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TAKE NOTICE. WE ARE ALWAYS IN the market and pay highest prices for all kinds of Scrap Metals, such as Copper, Brass, Zinc drosses, Skimmings, Brass filings, etc. Our terms are Net Cash. Drop a line and we will be pleased to name best prices, F. O. B., your city. H. Kander, Bowling Green, Ohio.

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CONTRACTS WANTED FOR MEDIUM and heavy gray iron castings. Send us your specifications for estimate. Ford & Donnelly, Kokomo, Ind.

CONTRACTS WANTED FOR MAKING heavy and medium gray iron castings and iron stairways for fire escapes. Niver Iron Works Co., Muscatine, Iowa. p.

CHEMISTS, ASSAYERS, SAMPLERS OF ORES, ETC.

ORES SAMPLED, TESTED, AND ASsayed. Analysis of ores, fuels, limestone, iron and steel, clay and cements. Ethelbert Ely, Dover Laboratory, Dover, N. J. Established 1868.

MISCELLANEOUS

WANTED, SECOND HAND POWER punch, geared or quick action, cap ½" x ½", throat 18" x 36". 1 splitting shear, ⅜ plate, power. 1 power bevel shear. 1 power bending rolls, 6' x 10.' 1 radial drill press. 1 small air compressor. All the above machinery does not have to be in good condition, as long as it is in repairable condition. Must be cheap for cash. Address James Smrz, 1527 So. 42nd Court, Chicago, Ill. p.

REORGANIZATION

Southern Steel Company

The Plan and Agreement of Reorganization, dated May 15th, 1908, having been approved by all the depositing First Mortgage Bondholders and Collateral Trust Note Holders, and by creditors to a majority in amount of all claims filed, proved and allowed in the bankruptcy proceedings, and by stockholders to a large amount, the Reorganization Committee, in order that all security holders and creditors may become parties to the said Plan of Reorganization and receive the benefits thereof, HAVE EXTENDED THE TIME FOR THE MAKING OF DEPOSITS THEREUNDER TO AND INCLUDING JULY 1ST, 1908, AFTER WHICH DATE FURTHER DEPOSITS WILL ONLY BE RECEIVED SUBJECT TO SUCH TERMS AND CONDITIONS AS THE COMITTEE MAY SEE FIT TO IMPOSE.

Creditors are reminded that their claims must be filed, proved and allowed in the bankruptcy proceedings prior to deposit under the Plan of Reorganization.

New York, June 15, 1908.

JAMES T. WOODWARD, Chairman;
OTTO T. BANNARD,
ROBERT B. VAN CORTLANDT,
WALTER T. ROSEN,
FRANKLIN Q. BROWN,
W. P. G. HARDING,
CORNELIUS VANDERBILT,
Reorganization Committee.

D. G. BOISSEVAIN, Secretary, 30 Pine street, New York City.

HORNBLOWER, MILLER & POTTER, Counsel.

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One Tank with 15 coils, 14′ x 8′ x 1¼″ extra heavy pipe in first-class condition. Can be used for Cooling or Heating system. Taken out of a Cold Storage Plant.

ISIDOR COHEN,
Milwaukee, Wis.
P

Stack For Sale.

Nearly new, 52 in. dia. x 75 ft. 25 ft. ⅜ in., 25 ft. ¼ in. and 25 ft. 3/16 in. metal.

Central Transfer Co.
BALTIMORE, MD. P

FOR SALE.
20 Horse Gas Engine, $250.
10, 12 and 15 Horse, $175 and $225.
Steam Engine 11″ x 14″ $150, 9″ x 13″ $125.
Heaters, Pumps, new Boilers made to order.
Boilers, engines all sizes carried in stock for immediate shipment.
D. L. CASEY Machine Co.
Springfield, Ohio. P

CAST IRON WATER PIPE FOR SALE

Ninety-four tons (145 12-ft. lengths) 14 Standard Cast Iron Water Pipe, weighing 1,266 lbs. per length; used two years above ground for fresh water. Equal to new. Immediate delivery.

Address AUMEN
MACHINERY & SUPPLY CO.
324 No. Holliday St., Baltimore, Md. P

FOR SALE—Machinery Bargains

LATHES
19 x 8 Lodge-Barker, comp. rest, solid spindle.
24 x 12 Flather, raised to 30 in. comp. rest, hollow spindle.
26 x 12 Blaisdell, comp. rest, hollow spindle.
60 in. Stevens Pulley Lathe.

PLANERS
32 x 30 x 10 New Haven, Single Head.
40 x 40 x 11 Aldrich & Calvert, single head.

SHAPER
20″ Lodge, Davis & Co., Geared.

MILLER
Duplex Brass Miller.

ENGINES
Corliss, Automatic, and Throttling, all sizes.

BOILERS
Tubular, Fire Box and Vertical, all sizes.

MISCELLANEOUS
Pumps, Heaters, Tanks, Wagon Scales, Saw Mill Machinery, etc.

We are sole manufacturers of the celebrated "Leader" Injectors and Ejectors.

THE RANDLE MACHINERY CO.
1747 Powers St., Cincinnati, Ohio

RAILS.

40, 56, 60, 70, 75, 80, 85 and 90 lb.
RELAYING RAILS
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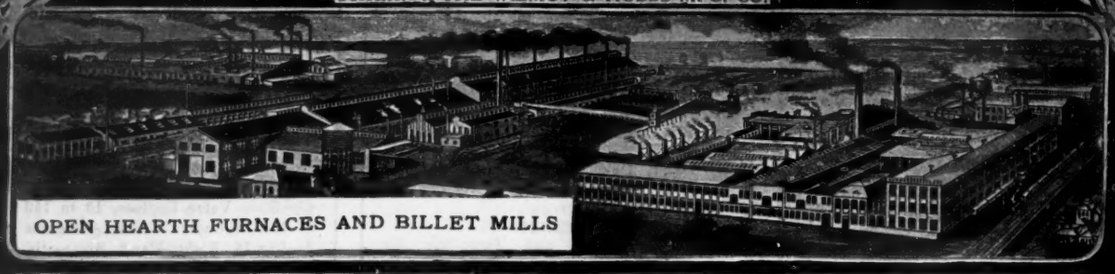

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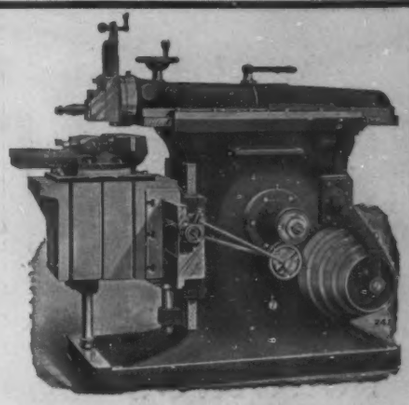

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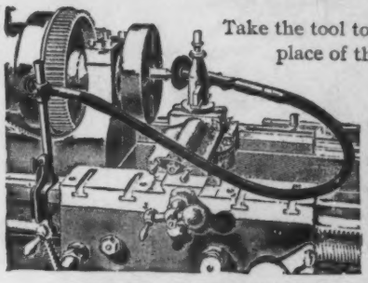

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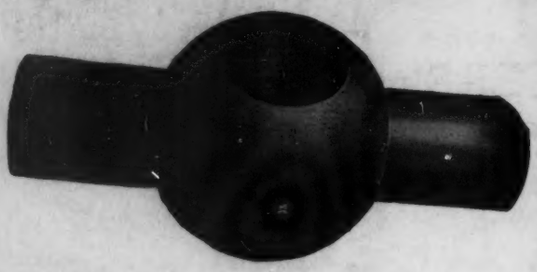

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